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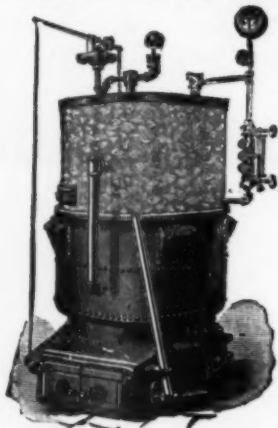
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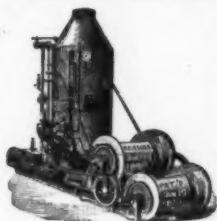
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JOURNAL  
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*"I cannot help plead to my countrymen, at every opportunity, to cherish all that is manly and noble in the military profession, because Peace is enervating and no man is wise enough to foretell when soldiers may be in demand again."*—SHERMAN.

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VOL. XV.

MARCH, 1894.

NO. LXVIII.

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SHOULD THE FIXED COAST DEFENSES OF THE  
UNITED STATES BE TRANSFERRED TO THE  
NAVY?

BY LIEUT.-COL. PETER C. HAINS, CORPS OF ENGINEERS, U. S. A.

WITHIN the last few years there have been published by the Navy Department in what is known as the "Annual of Naval Intelligence" two articles on the subject of the coast defense systems of the nations of Europe. These publications are for the general information of naval officers, and the articles referred to are intended to show that coast defense has become a purely naval operation, and that the entire organization, administration, and control of the fixed defenses of the United States should be transferred to the exclusive control of the navy. These publications are expressive of the views of many naval officers, and are apt, if they stand uncorrected, to give erroneous impressions.

In the Annual Report of the Secretary of the Navy for 1891, the subject of the transfer is referred to as a question for the consideration of Congress, though the secretary does not commit himself in favor of, or against it. Though the subject does not seem to have attracted much attention among army officers, it is one of great importance to the two branches of the military service and to the country at large.

If it be true that the fixed coast defenses of this country can be more efficiently and economically managed by exclusive naval control, the navy should control them. If, on the contrary, a transfer of control would result in loss of efficiency and economy, then the control should remain where it is and always has been—with the army. No sentimental regard for old-time prejudices need stand in the way. The service should be managed by that branch that can do so in the most efficient and economical manner.

In discussing this question there are certain matters that must be kept clearly in mind. They are factors that cannot be eliminated in the solution of the problem before us.

*First*, our people are averse to maintaining a large military or naval organization. They are too actively engaged in the peaceful pursuits of life to give much attention to questions of national defense. Our boundless resources, our isolated position, and our success in former wars induce a feeling of security on the part of our people, which, whether justified or not, is productive of a feeling of hostility to the maintenance of a large standing army or navy. There is no principle of governmental policy so well grounded in the minds of our people as that a large standing army or navy is unnecessary under our system of government. We cannot shut our eyes to this fact.

*Second*, under our system of making appropriations for defensive works of all kinds, we must be prepared to face the exigences of war with the probable means that will be at our disposal on the breaking out of war. War comes to us unawares. It does not wait till we are prepared for it. Sometimes it comes even against our will.

In 1812, the Congress of the United States solemnly declared war against the most powerful maritime nation on earth, while we were notoriously unprepared. Without a single line-of-battle ship, with only about half a dozen of comparatively insignificant frigates, and no coast defenses, we unhesitatingly entered in a struggle with a nation that counted its battle-ships and frigates by the hundred. Our feebleness on land and sea and the unprotected condition of our coasts were so fully recognized by the party in power that it was not thought expedient to send even a single one of the few vessels we had, to sea. This national humiliation was only averted by the strenuous efforts of a few naval officers who, understanding the importance of utilizing the

little navy we had in offensive operations, went to Washington and induced the Government to change its policy. The heroic deeds of that small navy constitute the brightest features of that war.

Time and again we have been on the verge of war with that same powerful maritime nation, and we never counted the cost. The same has happened in other wars; we are always ready enough to go to war when the national honor is at stake, but we are too much engrossed in the peaceful avocations of life to make adequate preparation for it until the war is actually upon us.

The question of national defense must be treated, therefore, from a practical standpoint.

The claim is made that coast defense is a purely naval operation; that the land batteries and forts constructed for coast defense purposes should, therefore, be commanded by naval officers and manned by naval levies; that most European nations, notably France and Germany, acting on this belief have placed their fixed coast defenses under naval control, and that we should follow their example. It is claimed that efficiency will be promoted by this change, and it seems to be assumed that it will result chiefly from unity of command and from the supposed advantages that are to accrue from having in the naval service a class of men who are trained to fight afloat or ashore, as emergencies demand. The fact that Great Britain, whose fixed coast defenses are controlled by the army, has not transferred them to the navy, is admitted, but we are given to understand that she is gradually being educated up to it. It is not definitely claimed that any economy would result from the change in the United States, but Sir William Jervois is quoted as saying that in Great Britain "it would be productive of economy through its intrinsic value of unity and simplicity." Moreover, it is claimed that the increased range of artillery, the development of rapid firing guns, the charging of shells with high explosives, the dynamite cruiser, torpedo and submarine boats, and electric search-lights, have entirely altered the question of coast defense.

Before proceeding to discuss these various claims it is well to inquire just what is meant by coast defenses, and the part they play in war, particularly with reference to the United States. The term coast defenses as we understand it, is intended to embrace all the means of war used in defending the maritime border of a country, as distinguished from those applied to the

defense of a land frontier. Naturally they are divided into two classes—the fixed and movable. The former consists of forts, batteries, channel obstructions, and the various needful works of defense against land attack; the latter consists of battle-ships, cruisers, floating batteries, torpedo boats, rams, and in general all the floating means of offensive or defensive warfare. We include battle-ships and cruisers because, while they are not designed especially for coast defense proper, they are sometimes the best kind of coast defenders when operating in some far off sea. In the defense of a land frontier the same division holds good. There are the fixed defenses which comprise the fortifications, and the movable which is the army in the field. The latter plays the same part in the defense of the land frontier as our navy should in the defense of the coast.

The fixed defenses are capable only of passive resistance, they cannot be used until the enemy comes within their radius of action. The movable defenses on the contrary are capable of active resistance. They can seek out the weak points of an adversary and deliver their blows where least expected, and frequently at long distances from their bases. If unable to cope with him they can run away, get out of his reach, and return to the attack when a favorable opportunity offers. This gives rise to two entirely different classes of operations, which are styled the passive defense, and the active defense. To the passive defense is assigned the duty of guarding the approaches to rivers and harbors and keeping the enemy beyond bombarding distance of our cities, dock-yards, and naval establishments. To the active defense is assigned the duty of protecting our commerce on the sea, destroying that of the enemy, preventing the blockade of our ports, and generally of attacking him wherever found, providing the object to be gained justifies it and the chances of victory warrant the hazard of battle. In the United States the passive defense is assigned to the army—the active defense to the navy.

An efficient system of coast defense for one particular nation is not necessarily to be modelled exactly like that of another. In a general way it may be said that the object to be accomplished is the same, but its accomplishment may be greatly modified by circumstances. The length of a nation's sea-coast, the value of its commerce, the wealth of its seaboard towns, its form of government, its internal resources, its position with reference to its most probable adversaries, the organization of its military and

naval forces, its military or naval power with reference to that of its probable adversaries, all tend to modify the conditions, so that a particular policy on the part of one nation is not necessarily the best for another to follow. The navy may be the chief defense for one nation, and the army that of another. It does not follow that because Germany has placed her fixed defenses under control of her navy that we should follow her example. Neither does it follow that because Great Britain has kept her fixed coast defenses under the control of her army that we should follow her example. The organization and control of ours should be based on the conditions existing in the United States, not on those existing in Europe. The nations of Europe drain the resources of their people in maintaining armies of colossal proportions for purposes of *defense*. The conditions perhaps require it, but no one would seriously propose that we follow their example in this. Great Britain maintains a navy that is equal to or greater than any two continental navies combined. Would any one propose that we follow her example in this? The maritime inscriptions of France and Germany require that every able-bodied seaman in those countries be enrolled. Service in the navy is compulsory on the part of the entire maritime population, if the state requires it. Does any one suppose that compulsory service in our navy would be tolerated? This whole matter of coast defense and its control must be determined in the United States by the conditions existing here, and on the basis of efficiency and economy coupled with those conditions.

The main object to be accomplished by the proposed transfer is "unity of control," and while it will be admitted that "unity of control" is desirable in either military or naval operations, it cannot be claimed to be practicable in operations partaking of the character of both, and in the United States the conditions are such that coast defense cannot be entrusted solely to the military or naval element. There are certain duties that must be performed by the navy, and there are others that can be efficiently performed only by the army. To undertake to train men for equally efficient service in forts on shore, and in ships at sea, is a hopeless task and is not compatible with efficiency in either. We seriously doubt whether any considerable number of naval officers regard it in any other light. It takes years to make a good sailor; no amount of shore duty will do it, and it must be remembered that "untrained men on board a modern war-ship in



action would be worse than useless." Moreover, there is a popular impression that a good sailor does not as a rule make a good soldier. Every large ship of war has a guard of marines for this reason. For the same reason even at our navy-yards a marine guard is stationed. We do not disparage the American seaman. His achievements illumine the brightest pages of our history, but his laurels have been won afloat, not on shore behind parapets of earth and masonry.

Moreover, it is a well-known fact among naval officers that long service on shore is destructive of efficiency in seamen as such. An example of the good results of sea training and the bad results of training in port, is afforded by the respective navies of Great Britain and France in the latter part of the 18th century. The victory of Trafalgar, which established the supremacy of Great Britain on the sea and almost destroyed the sea power of France, was largely due to the magnificent naval training that the seamen of Britain had received in the ten or twelve years' constant sea service which its navy had immediately preceding that battle. It is true that the sailing of a modern ship of war does not require the same kind of nautical skill to manœuvre it that it did formerly, but to get from it in battle the full benefits of all its fighting powers will call forth on the part of the fighting element all the resources of the best seamanship, steady nerves, and thorough discipline, all of which can only be acquired by years of training at sea. The "nerve" and "readiness of resource" so essential to the efficient handling of the modern ship of war are not to be cultivated on shore. Does not shore duty even now, in his legitimate sphere, occupy as much of the time of the naval officer as he can afford to give? An increase in the number of shore stations, while it may not be objectionable in some respects, cannot fail to lower the efficiency of the navy as an offensive arm.

Moreover, the controlling power in either military or naval operations must have a thorough knowledge of the elements controlled or a judicious use of them cannot be made. It is unreasonable to expect that officers of either branch should be proficient in both. The modern improvements in weapons of war have already greatly enlarged the range of technical knowledge required of an officer in either branch of the service. Far more work is necessary to produce an efficient officer now than formerly, and this applies with especial emphasis to the naval offi-



cer, for in this branch the greatest and most numerous additions have been made. To enlarge the scope of his duties in a direction so at variance with the traditions of the service is to impose on him a burden that can only be borne with diminished efficiency. Life is too short to expect the ordinary man to attain proficiency in all the details of two such widely different professions. "Unity of control" must give way to the more important consideration of efficiency of control.

The Secretary of the Navy, in his annual report for 1892, wishing to free the navy of the burden of the Naval Observatory, especially calls the attention of Congress to the fact that "the professional attainments now exacted of our officers (naval) and necessary to their efficiency include so wide a range of subjects and extend to such minute details that they have *no time to devote to matters so far outside the line* of their profession as those that pertain to the management of a great modern astronomical observatory." And yet many people will think that the duties of the naval officer are more intimately connected with those of a Naval Observatory than with forts and batteries on land. Does not the work of the Naval Observatory relate almost exclusively to the science of navigation? The course of a ship is fixed by observations on the heavenly bodies, and the science of astronomy is inseparably connected with the safe navigation of a ship at sea, but forts and batteries are immovable; there is nothing about them that requires the service of a naval officer in their management or control, nor is there any service required of them that the artillery officer of our army is not equal to.

As a matter of fact the continental nations of Europe do not try to produce a class of men for coast defenses who are equally adapted for service afloat and service ashore. When seamen are put ashore to fight, it is done from necessity and not because of their adaptability for both services. Men as a rule are trained for special duties, and as far as practicable their service is limited to those specialties. In no other way can real efficiency be attained on a modern war-ship. The latter as is well known is a most complicated piece of mechanism. Its motive power is dependent entirely on the efficiency of a body of men and officers composing the engineer department. Without that body of men it would be a helpless mass of machinery, as useless for war purposes as a chronometer with a broken main-spring for determining longitude. The importance of specializing this important

branch of the Navy Department is easily understood, and the line officer of the navy has no difficulty in understanding the necessity of this body of specialists confining its operations to the special service for which it is organized. The difference between the duties of a line officer of the navy and those of the officer of the engineering branch, is not greater than the difference between the duties of a sailor and those of a soldier. In the Franco-German war, French sailors were organized into a fighting land force, but the circumstances were peculiar; they were not needed on ship-board because the navy of France as an offensive weapon was useless. Every man who could handle a gun was needed on land and nowhere else. With our resources of men on shore and the demand for trained men on our ships such an emergency cannot arise here.

We are told that the service of sea-coast artillery and the planting of torpedoes for obstructing channels "should be entrusted to a *permanent personnel*." A permanent personnel is of course impossible, but the idea conveyed is correct. The organizations that have charge of them should be permanent and the personnel should be liable to as little change as possible. In Germany the sea-coast artillery is served by an organization known as the Marine or Naval Artillery; the torpedo service is managed by torpedo divisions. We have neither naval artillery nor torpedo divisions in our navy, nor any other permanent organizations in that branch of the service to manage them, but we have permanent organizations in the army that have managed them and do manage them now. Moreover, the personnel of those organizations is not liable to frequent change. The duty of manning our sea-coast artillery falls to the artillery branch of the army, an organization provided by law, and intended chiefly for that service. The planting of mines for obstructing channels is confided to the Corps of Engineers. Thus the requirement of personal organizations for managing sea-coast artillery and torpedoes that is used as an argument for the transfer of the fixed defenses to the navy, is fully met as the services are now organized, and would not be if the transfer were made.

The planting and removing of mines unquestionably requires boat work, but it does not require a professional seaman to perform the duty. The mines are generally placed in channels, careful surveys of which have been made. They are all within a short distance of the shore and covered by the guns of forts.

They are operated from some secure and concealed place unexposed to the guns of the enemy, by means of electricity and cables that lead to the operating room. It does not require a seaman to understand how best to place them, and a seaman would not as a rule be the best person to operate them. The control of torpedoes being governed by electrical apparatus, men familiar with the use of electricity are needed to serve them. The soldiers of the Engineer Battalion are instructed in this special work. Moreover, they are not deficient in skill in the handling of boats. The laying and taking up of mines is a part, and a most important part, of the course of instruction of all engineer soldiers at Willet's Point. The men may not be able to navigate ships, but they are fully instructed in the management of such boats as are needed for this work. An army in the field is usually accompanied by a ponton bridge equipment for crossing rivers on its line of march. The operation of crossing is often accomplished on a bridge constructed by engineer soldiers, on boats. Sometimes the crossing is made in boats, but it is not considered necessary to add a naval force to the army because the crossing of a river requires boat work.

The improvement of rivers and harbors is by law confided to the Corps of Engineers of the army, and the officers of that corps are familiar with the tidal currents, the shoals, the channels, and the character of the bottom of the rivers and harbors under their charge. They also construct the forts and the needful casemates for operating the mines. It will strike many people as quite appropriate that the officers who are engaged in improving the channels of rivers and harbors ought to be qualified to perform the duty of obstructing them.

The statement that "the technical duties of the artillery, ordnance, and engineer corps are sufficient in number and importance to require their full attention and closest study and application to insure thorough efficiency and organization in their respective branches," is true, but how does that fact furnish a reason for transferring the duties of all three to a naval officer who is not thoroughly instructed in these specialties? Is it not known that the chief duties of those corps are most intimately connected with coast defense? The very fact that the technical duties of those corps require full attention and close study is one of the strongest reasons why they should not be transferred to a single officer whose duties lie in a different direction. One is

almost tempted to ask, are the duties of the navy so few and of so little importance that it can afford to take upon itself the burden of those of the corps referred to?

In the coast defense system of the United States both army and navy have their important parts to play, and to do so without friction it is only necessary that a clear and unmistakable line should separate their mutual duties and responsibilities. The navy has sole charge and control of everything pertaining to the active defense—the army the less desirable, but equally important part, the passive defense. The line is clear as the services are now organized. With a clear understanding of the duties of each, there is no reason why they may not successfully coöperate. They have often done so, and can do so again. An underestimate of the intelligence and patriotism of the rank and file of the service, as well as of the powers of the Commander-in-chief of the Army and Navy, is made when it is assumed that “prejudice of corps” will prevent efficient coöperation when coöperation is necessary.

We are told that the government of the United States on the recommendation of the Endicott Board proposes to expend a large amount in the construction and armament of fixed coast defenses, and that no force exists for manning this armament, and no provision made for training a fit personnel. This is a remarkable statement. Has the fact been overlooked that the United States maintains an artillery force of about 4000 men in the aggregate, whose duties are almost naught if not connected with coast defenses? The fact that these men now perform to a large degree the practical duties of infantry, must not obscure the fact that up to the present time there have been no modern armaments to be manned. The officers of the artillery branch of the service are being instructed theoretically at the school at Fort Monroe in all that pertains to modern sea-coast artillery and sea-coast defense, but until modern artillery is provided the men cannot be practically instructed. The best argument for putting the fixed coast defenses under the control of the navy is, that from 1865 up to the present time there have been none worthy of the name.

In regard to the service of fixed mines to obstruct the channels of entrance to our harbors, is it not known that the Government maintains a force of about 400 men at Willet's Point, who are instructed in and charged with the management of fixed

mines, and that details of officers of both artillery and infantry are also instructed in the same branch? We do not claim that the organization of the artillery or the engineer battalion is the best possible for the efficient performance of those duties, but we decidedly object to the statement that no such force exists. They may not be adequate for perfect defense of all our harbors, but they are more than adequate for all the modern armaments that have thus far been supplied.

It has always been held, not only in this country but in all countries, that the service of the navy is so different from that of the army, that two distinct organizations are indispensable to efficiency. No modern requirements have changed these conditions. The two services are and must be maintained distinct and separate.

The defense of a harbor does not consist alone in resisting a bombardment, or the forcible passage of a channel. If the fortifications be strong, neither will be attempted unless it be in overwhelming force. In that case it is better that our small navy, except such parts of it as are designed for purely local harbor defense, be gotten away to some other point where it will be less liable to be captured or destroyed. As a general rule, however, no attack will be made if the chances of suffering great loss overbalance those of victory. The object of fortifications is to bring about these conditions. The enemy will then be compelled to select some other point, which is not defended, land a force under the cover of the guns of its fleet, and attack overland. Resistance to such attack cannot be successfully made by a navy alone. The brunt of it must fall on the army. Forts intended primarily for coast defense are therefore liable to attack in rear. The probability of such attack must not be overlooked and suitable measures taken to meet it. This can generally be done after the declaration of war, by the construction of temporary field-works, but in some cases the works should be prepared beforehand. If our navy be strong enough to prevent the landing of such a force, the struggle will be on the sea and the fixed defenses will not be called into play, but if it be too weak to prevent the landing, the defense must fall on the army. The defense is not, therefore, "purely naval" and it is a perversion of terms to so state it.

For the navy to take control of the fixed defenses would require the addition of a large force to that branch of the service,

and that force would necessarily be a land force. It matters not what it is called, whether it be naval artillery, or naval infantry, it would be essentially a land force, because the seamen of our navy cannot be spared for that service, and because they are not suitable if they could. To effect this change, therefore, would require legislation. Whether Congress is prepared to add this force to the navy may be doubted. This necessary addition of a large land force to the navy of Great Britain was one argument made against the transfer of the fixed defenses of that country to the navy a few years ago, when this same subject was agitated there. Whether or not the objection had weight we cannot say, but the fact is, that the change was not made, so that the control of the fixed coast defenses of Great Britain remain as they were, essentially the same as in the United States.

We are told, however, that the transfer was not made "owing to the lack of men in their navy as now organized." If Great Britain has not men enough in her navy to take control of her fixed coast defenses, how much harder would it be for this country to do so, which has such difficulty in securing seamen to man its ships. The complaint is constantly made that our navy is deficient in the number of its able seamen, and ships are often sent to sea without their full complements of men. How then can a sufficient number be spared to man the fixed coast defenses?

The organization of our army and navy is entirely different from that of most Continental nations. The latter as a rule provide for compulsory service in one branch or the other, and an immense reserve is available for expanding its personnel in time of war. In our country compulsory service will not be tolerated and the army and navy will each have to depend both in war and peace on voluntary enlistment. This of itself is a potent reason for not transferring the fixed defenses to the navy. We have no trouble in keeping our army up to the full standard and in time of war the militia of the States would furnish a reserve of excellent material for expanding it.

The navy of the United States is not organized to take charge properly and efficiently of the construction, preservation, and repair of fortifications. These duties are inseparably connected with their control. Forts must be built, and from time to time repairs or modifications in plan are necessary. These duties naturally fall to the Corps of Engineers of the army, a branch of the service especially organized and trained for the purpose

and composed of men who are supposed to be familiar with the technical details of such constructions. No civilized nation in the world assigns such duties to its naval officers. It will not do to say that the army engineers may be detailed for such duty when needed, as in Italy, and while so detached, to be under naval control. These duties are not of a temporary character. They are as permanent as the navy itself, and a permanent organization is essential to efficient administration. A special corps of military engineers would have to be organized as a part of the permanent naval establishment. In no other way can "unity of control" be maintained.

Moreover, the ordnance in the two branches of the service is not alike, either in calibres or mountings, though an alleged similarity is sometimes made use of as a reason for the transfer. The guns being different and differently mounted, the drills are different. As a matter of fact the army as yet has but few modern guns of any calibre, but they are now being constructed and in time will be supplied. The 8-inch and 10-inch breech-loading rifles for batteries of modern construction are to be mounted on disappearing carriages. The gun when fired disappears from sight behind the parapet, and in that position can be loaded preparatory to firing again. The navy has no such mount as this, nor is it suitable for service afloat. The entire service of such guns is totally different from that of similar guns on ship-board.

The 12-inch breech-loading rifle will be mounted on lift platforms. The gun will disappear behind the parapet, but the entire gun and platform will be raised and lowered by machinery. Our navy has no such mounts as this.

The 12-inch rifled mortar is a most important arm. It has an effective range of nearly seven miles, and no fleet will anchor within that distance of one such battery if it be well served. This is a weapon entirely different from anything in the navy. On board of a ship it would be useless—on land it is destined to be a most formidable weapon.

In Germany one of the reasons given for transferring the fixed defenses to the navy was that the guns and carriages in the two services are similar, but this similarity does not hold in the United States. The defense there also consists largely of turrets moved by steam or hydraulic power, and this fact was also assigned as a reason for the transfer, as its army had no men who are familiar



with the manipulation of the machinery. In the existing conditions there will be few turrets in the coast defense system of the United States. We have not yet begun the construction of any, and when used at all they will be for guns of 16 inches calibre, a gun that the navy of the United States does not, at present, contemplate using. But even if the defense were to consist largely of turrets, our navy has not men enough to supply the force to work them. The steam engineering branch of the navy is already overworked and more officers and men are needed in that branch to supply the needs of ships. Moreover, a marine engine is not needed to manipulate a turret, and the graduate of the artillery school at Fort Monroe, while he may not be an expert in steam engineering, is not totally ignorant of the principles on which steam engines are constructed, and doubtless would be as competent to run an ordinary engine as the average line officer of the navy.

It is stated that the accomplishment of such a change as the transfer of the fixed defenses to the navy, in Germany "where the influence of the army is supreme, indicates that the benefits to be derived were considered sufficient to overcome all prejudices of corps." This statement shows that it is assumed that there were "prejudices of corps" to be overcome in order to effect the change, and that the influence of the army was exerted in opposition to it. This is an unwarranted assumption calculated to convey the impression that the two services were scrambling for the duty of controlling the fixed defenses without regard to the question of expediency. There is not a fact stated that indicates the existence of any "prejudices of corps." On the contrary, the Emperor in his decree states explicitly that the two branches—the army and navy—"are to work together according to clearly laid down rules." He does not seem to have been aware of the prejudices that are assumed to exist. That there may have been and may still be differences of opinion is probable. In such matters honest difference of opinion is fairly allowable. That the benefits expected to be derived were considered sufficient to justify the change, is unquestionable, or the change would not have been made; but it is quite as reasonable to suppose that the "supremacy of the army" was exerted, if at all, to bring about the change, as it was that it was exerted to prevent it—indeed more so, for there is every reason to suppose that the army was glad to be relieved of that burden.



If the change was wrought in spite of the supremacy of the army, how does it happen that the supremacy of the navy in Great Britain could not accomplish it? There is only one fair inference to be drawn from the action taken in each country, and that is, that it was expedient to place the fixed defenses of Germany under the control of the navy in order to give freedom of action to the army, and to keep the fixed defenses under the army in Great Britain in order to give freedom of action to the navy.

Coast defense ought to be organized on principles of efficiency and economy. Organized on that basis it is neither purely naval nor purely military, but partakes of the character of both. A purely naval defense of the coasts of the United States cannot be made except at such an enormous cost that it would be financially impracticable. This is practically admitted when it is stated that "if a navy is competent for its work no other defense will be called into play." The assumption, however, that "coast and harbor defense, like every other factor in war, is a matter of compromise," we do not understand. That all factors in war are matters of compromise is a new theory to us. War is generally the result of the uncompromising nature of its factors. If any nation in the world could afford to treat this question as a purely naval one, that nation is Great Britain, but she does not. She relies for defense to a great extent on her navy, but she can do this as no other nation can, by reason of her supremacy on the sea. But even she does not rely on it alone, she girdles herself with a system of forts for the defense of her inner line should the outer one be broken. The fortifications constitute the military part, her battle-ships and cruisers the naval part.

It is doubtless true that "if a navy is competent for its work, no other defense need be called into play," but it is assuming too much to say, that if it is incompetent no other defense can prevent disaster. History is teeming with examples of successful coast defense without the help of a competent navy, in fact without any navy at all. At Charleston Harbor we have two examples in our own history where the defense was eminently successful against overpowering odds, though there was no navy either competent or incompetent. The first attack on Fort Fisher at the mouth of Cape Fear River, was an utter failure, though made by an overwhelming naval force, yet the Confederates had no navy. An incompetent Confederate fleet in Mobile Bay aided by

a few guns on Mobile Point and a few torpedoes in the channel held at bay for a long time the greatest admiral in American history, and if the torpedoes had been more efficient would doubtless have caused the destruction of the most powerful fleet, that had up to that time, ever been collected in American waters. Coming down to more modern times, does any one doubt what the issue would have been at Alexandria if the Egyptians had had a few well-served modern guns of a calibre equal to those of the attacking British fleet?

In some respects our navy must necessarily be incompetent.

Whatever naval force we possess should be of the best and most efficient type, and probably will be, but it is not at all probable that it will ever be able to contend for supremacy on the sea. The fact is too patent that this country will not maintain a naval force sufficient to do so. How then can the navy be made competent? Surely not by transferring the fixed coast defenses to it. That would tend to make it more incompetent still, for it could not fail to take from it a part of its offensive power on which its efficiency must necessarily depend.

Suppose, for a moment, that war is declared between the United States and Great Britain, and the navy has control of all the fixed defenses. A British fleet assembled at Bermuda threatens the entire Atlantic seaboard and all the important cities are in danger of attack—as any one of them can be reached in two or three days. A perfect state of preparation for war does not exist. It never does. War comes upon us before we are ready for it. Much remains to be done, but there is no time now to do it. The immense natural resources of the country cannot be utilized, while the wealth of our seaboard towns is a source of weakness. Consternation prevails everywhere, and it is by no means improbable that a strong party may for political or selfish motives be opposed to the war. An army is immediately organized for an overland conquest of Canada, and the result in that direction is of course only a question of time, but the army can do nothing more.

The naval commander at New York, justly regarding his district as of most importance, wants more guns and more ships placed at his disposal. He detains all he can for the protection of New York that does not involve a positive disobedience of orders. He may be the best and bravest officer in the navy, but the responsibility for the defense of his district is on his shoulders

and he justly appreciates the inadequacy of his means. He cannot weaken himself under the circumstances by detaching a force for the protection of other points equally threatened. The responsibility for that must come from higher authority.

The officer in command at Boston sees the matter in a different light. Congress has not been as liberal to Boston perhaps and the defenses are thus in a more backward state. To him and to many other influential people, Boston is of more importance than New York. He is, therefore, calling lustily for more ships and guns, and he holds on to all that come within his reach.

The commander at Norfolk sees the importance of his station. The dry docks at Norfolk and Newport News must be protected at all hazards. It may be of more importance than the temporary loss of other and more wealthy cities. To him his station is of far more importance than all others, and so on throughout the list.

A part of the army which ought to be on its way to Canada, is perhaps recalled and is spread out in a thin line along the seaboard to assist in the defense, but the artillery arm, not having had experience with sea-coast guns, is like the Italian, given to firing into its friends or into the mine fields.

The Secretary of the Navy not being an expert in naval matters is harassed and embarrassed by the demands of his subordinates, each one clamoring for more assistance. The President himself is no more an expert than his Secretary, and together they are only able to direct the policy of the Government, the details of the operations of the forces under them must be directed by the officers in command.

The whole navy is thus thrown on the defensive. Its energies are paralyzed. Many of its officers have been too long on shore duty and too little at sea, to be thoroughly conversant with the engines of war that they command, not through any fault of their own, but because under the system shore duty was just as important a part of their profession as sea duty, and consumed a large part of their time.

On the other hand suppose the army has on its shoulders the burden of the fixed defenses, and the navy has no responsibility in connection therewith; it then can act with more freedom, it will seek the sea and attack the enemy's commerce, his communications, or weak detachments, in fact strike him wherever there is a reasonable prospect of success. A navy cannot be construc-

ted after war is declared. It takes too long to build a modern ship of war. Practically the war will have to be fought out with the means at the disposal of the Government at its commencement. If the navy be too weak for efficient offensive action, it will not be made stronger by the burden of the fixed defenses.

In case the war be with some other nation the conditions would of course be different, but in any case, our navy being small in number of ships, should have the utmost freedom of action. Whatever tends to restrict this freedom cannot fail to detract from its efficiency. "Unity of control," therefore, so far as concerns the United States can only be had at the cost of diminished efficiency.

The evils of the existing system of coast defense are more imaginary than real. "Dual administration" is not necessarily incompatible with efficiency. It all depends on the difference in the character of the services administered. Efficiency is not to be had by administering the Department of Justice and that of Agriculture under a single head. "Dual administration" so far as concerns the coast defense of the United States is no new experiment. It has been in continuous operation in the United States ever since a system of coast defense was adopted. If it has serious drawbacks as is asserted, they have not been clearly indicated. The President of the United States is Commander-in-chief of both branches of the military service and it is safe to say that he can deal with them quite as well under existing conditions as if the jurisdiction of the one was extended and the other curtailed.

When the screw propeller was first applied to ships of war it was declared that the whole system of coast defense would be revolutionized, but the practical test of war proved this to be a delusion. In the same way when iron armor was applied to ships of war the same cry was raised, but this also proved to be a fallacy. We are now told that the more recent improvements in weapons of war have "entirely altered the question." But have they? The increased range of artillery has merely necessitated the construction of defensive batteries farther out than formerly. The increased power and penetration of projectiles has merely caused an increase in the thickness of parapets, or the use of armor. Dynamite as an explosive, the dynamite cruiser, the torpedo boat, the electric search-light, the submarine boat, and all other modern appliances, though they add to the technical details of defense

and attack, do not change the principles on which coast defense is founded. Those principles are the same to-day as they were a hundred years ago.

To claim that the effective range of artillery is from 10 to 12 miles and quote that as one of the reasons for putting the fixed defenses under the control of the navy, is, to say the least, putting it rather strong. A range of 10 to 12 miles is certainly possible with modern guns, but practically it is not attainable, certainly not on ship-board. Such ranges require the gun to be elevated at a high angle, which the carriage does not generally admit of and which is seldom desirable even if it did. Modern high power guns are not intended for any such ranges, but rather for close work. Naval authorities are nearly all agreed that while battle between modern war-ships may begin at long range, the fighting will be forced at close quarters. The bombardment of Alexandria was done at comparatively short ranges. A 12-inch breech-loading rifle of the best modern construction, with an elevation of 15 degrees, and a muzzle velocity of 2000 feet per second, has a range of less than seven miles. The 16-inch breech-loading rifle (Krupp's) with the same elevation and same muzzle velocity, has a range of only 7.3 miles. Guns on ship-board cannot be, as a rule, elevated at an angle exceeding 15 degrees. When fired even at that angle the strains on the gun and deck are sufficient to restrict the practice to the most pressing necessities. Practically, therefore, the range does not exceed about 7 miles at the furthest. But whether the range be 7 miles or 12 miles, it is difficult to see how it affects the question of the proposed transfer.

No one will question the fact that "a ship only two miles distant, especially when in motion, is very difficult to hit; while towns, manufacturing establishments, etc., can be bombarded at any practicable range." But how that affects the question of transferring the fixed coast defenses to the navy is not clear. Would the ships be more easily hit if the navy had control of the fixed defenses, or would towns and manufacturing establishments be less easily bombarded? Yet we are told that "these facts, together with the development of rapid-firing guns, the charging of shells with high explosives, the dynamite cruiser, torpedo and submarine boats, and electric search-lights have entirely altered the question of coast defense."

As to the effect that submarine boats will have on coast defense it is rather early to speculate. There is no such thing, as yet, as a

practicable submarine boat. As an implement of war the submarine boat has not passed the experimental stage; whether it will develop into a serviceable weapon remains to be seen. Submarine boats have been experimented with for years, but a satisfactory one has not yet been built.

A certain amount of success has been accorded the dynamite cruiser, but even this vessel has not yet been fully developed as a reliable weapon of war. Naval authorities are not agreed as to what may be accomplished by this vessel. The experiments recently made were not by any means satisfactory. To say, therefore, that the dynamite cruiser and the submarine boat have had any effect on the question of coast defense, is premature at least. What effect they may have remains to be determined. But in any case, whether they become useful weapons of war or not, it is difficult to understand what bearing that fact has now on the question of transferring the fixed coast defenses to the navy.

Speculation in regard to the changes that have been wrought in coast defenses by improvements in weapons of war may be freely indulged in and it may be useful to the student of war, but it will not do to assume too quickly that great changes have been wrought in its principles until it can be shown how they have been accomplished. We look to see many cherished theories overturned in the first serious conflict between modern ships and modern forts.

We are amazed at the statement made, that "the continental powers have not only initiated the plan of placing all coast defenses in the hands of naval officers, giving them the command of maritime forts and shores between them, but they are also *developing and extending* the plan." In what direction is the plan being developed and extended? Not seaward, for the navy has always had control in that direction. We are not told how and where this development is being made, but as it cannot be extended seaward we are forced to conclude that it is being extended inland. The logical deduction from this conclusion is, that the nations of Europe are gradually tending toward that condition of affairs, when the entire defense of the state will fall on the navy and armies will no longer be necessary. In the Franco-German war, Admiral Jaunguiberry and other naval officers of the French service were assigned to command of large bodies of troops, and the admiral did good service. Surely it is not possible that this assignment of naval officers to command on shore has been mis-

taken for a development and extension of the plan of coast defense in France.

The French system of coast defense does not seem to us to offer such advantages as would justify our discarding a system we have followed since one was first adopted, and adopting theirs. From the publications referred to, it appears that the coast of France is divided into a certain number of maritime districts which are commanded by naval officers of high rank; the districts are subdivided into sections and naval officers command the sections. The commander of a section and of a district may have land and naval forces under his command. The section commander is under the control of the Minister of War and the Minister of Marine in matters pertaining to the branches of each. The naval or marine artillery forming a part of the naval establishment mans the forts facing the sea, and forts facing landward are garrisoned by army forces. If the section commander requires more than three battalions of troops to aid him in the defense, the army officer commanding in the section takes charge of the operations on land. Unity of control seems, therefore, to become rather mixed. We are told that the "central idea" is, that the chief function of the navy is to fight the enemy afloat. The phrase sounds well, but practically the "central idea" is sometimes lost sight of, and the navy is required to fight him on land. On the whole, it does not seem that the line of division is as clear as it might be, and the placing of naval officers in command of army forces is little, if any, better than placing naval forces under the command of army officers. But what is of more importance, as showing the difference in the conditions there and here, is the fact that she has an enrollment of 160,000 to 170,000 seamen whose services are at the disposal of the government in time of war. She has in her navy afloat and in naval barracks a force of about 40,000 men—a number exceeding the aggregate of our army and navy put together.

In the Italian system "the forts occupying elevated positions are garrisoned by the army, while the coast batteries, including those serving submarine mines and other obstructions, are manned by the navy." What particular advantage is gained by this combination we are at a loss to understand, and we fail to see how "unity of control" is maintained. Neither are we informed of the particular altitude at which the army becomes efficient and the navy fails. For the designing and construction



of fortifications an officer of engineers of the army is detailed and assigned to the navy, assisted by other army engineers when necessary. To those forts garrisoned by the army, naval officers are assigned as experts to point out the several classes of vessels and to distinguish between friend and foe, for it was found in the naval manœuvres at Spezia that army officers could rarely distinguish between them, and were inclined to fire into the mine fields. This is a system that has resulted from "*much study, long experience, and many experiments.*" Comment is unnecessary.

A good deal of importance seems to be attached to the fact that Germany, the foremost military nation of Europe, has placed its maritime forts under naval control, and the decree of the Emperor in 1884 is quoted at some length, apparently to show, that in Germany coast defense has come to be regarded as a purely naval operation, and hence the reason for the transfer. The following is quoted from the decree: \* \* \* "It is considered that for a thorough defense the army and navy *should work together according to clearly laid down rules*, and the navy should be given supreme control of all *maritime* operations. \* \* \* From this time forward all harbor entrances must be in a condition to be immediately protected by mines and troops. Heretofore all this work having been entrusted to the army, the engineers during the operation of mobilization *were overburdened.*" We fail to find anything in the decree to justify the conclusions that coast defense is considered in Germany a purely naval operation. On the contrary, the "army and navy are to work together according to clearly laid down rules." How are they to work together unless each preserves its own organization? And if they do, what becomes of "unity of control"? Evidently the two services are expected to coöperate and neither "prejudice of corps" nor the nightmare of dual administration, seems to be regarded as a serious obstacle. We do not know what "clearly laid down rules" have been issued for the guidance of the two services, but it is evident from other parts of the decree that the Emperor desired that the burden of the coast defense fall on the navy. The reason seems to be given in the last sentence quoted, "the engineers during mobilization were overburdened."

Now let us look into this matter a little closer. What are the conditions in Germany? Surrounded by the most powerful of adversaries,—on the east, Russia; on the south, Austria; and on the west, France,—all striving for military ascendancy in Europe.



With an imaginary line for a boundary, she looks to be invaded from land rather than from the sea. Her army is, therefore, her main reliance for defense, and she uses it by invading the territory of her foe. Its teachings and traditions are all one way, viz.: That it must assume the offensive, and assume it quickly. To say that the navy occupies a secondary place in her policy of defense, is to attach too much importance to it. It is as nothing compared to her army. The temporary loss of a seaport is of little account if it can be offset with a victory like that of Sedan, or Sadowa. Germany can, therefore, almost disregard her coast defenses. It is far more important that her engineers should not be overburdened when her armies are being mobilized.

During the Franco-German war in 1870, not a single naval engagement took place and not a coast town was seriously threatened by either combatant. In the war between Prussia and Austria in 1866 it was much the same. In both wars the army was of first, the navy of secondary, importance, and it would be the same thing in another war to-day. The defense of the coast, therefore, in Germany, is of little importance as compared with that of the land frontier. It is important that her armies be as free and untrammelled as possible. The burden of coast defense in its entirety can therefore be left to the navy, because the offensive power of the army is increased thereby. The bombardment of a sea-coast town or the destruction of a naval establishment, such as a dock-yard, or even the temporary loss of a sea-coast town, while it might be a serious matter in some respects, does not compare in importance with the loss of an army in the field.

Now observe the contrast when we consider the defense of the United States. We have no powerful neighbors with enormous armies ready to overrun our territory. The Atlantic rolls between us and any formidable foe. On the land side we are secure from invasion. Mexico is too feeble to give us serious concern from the south, and not even Great Britain would be likely to invade us from the north. If she did, the result is not difficult to foresee. But on the sea-coast we are vulnerable. We have an immense coastwise commerce, a long line of sea-coast, many cities of great wealth along the seaboard, and whether our army be large or small, it cannot be used as an offensive weapon. Consequently our army is a purely defensive arm, our navy the offensive one. The conditions are precisely the reverse of those of the nations whose example we are asked to follow. The con-

ditions being reversed, the application of the principles should be reversed; in other words, our navy as far as is practicable, should assume the rôle of the army of Germany and act on the offensive. To do so with the utmost efficiency of which it is capable requires that it have freedom of action.

The conditions in Great Britain are different from those of other continental nations. Her navy is of the first importance, but by reason of her supremacy on the sea, she can use her army offensively. Her power on the sea is an absolute condition to her power on land. Without the former the immensity of her empire would be a source of weakness. In some respects the conditions in Great Britain are similar to those in the United States. She has an immense commerce, long lines of sea-coast, and rich cities near her seaboard. She has not the isolated position that we have, but her navy constitutes a barrier to invasion more difficult to pass than the Atlantic that rolls between the United States and the continent of Europe.

As to the matter of cost, the necessity of adding a large force and a construction corps to the navy, is manifest evidence that the transfer of control is not in the interest of economy. We may not be able to estimate just what the extra cost to the Government may be, because the details of the proposed new management are not set forth, but the necessity for a large addition to the force of the navy would necessarily add to its cost. The transfer, therefore, would not be an economical measure.

Now we submit that the spirit of active defense is that which should inspire our navy. The passive defense may be left to the army, because except in a war with Great Britain or some insignificant power, the army can be used in no other way. It was the spirit of aggressiveness that pervaded the German army in the Franco-German war that made it invincible. From the general down to the private in the rear rank the idea was constantly kept in view that the army was an attacking force. That same spirit should animate our navy in time of war, and in order that it may be so the idea should be thoroughly inculcated in time of peace. Our army is our defensive arm, our navy should be the offensive one. Do not hamper the navy with coast defenses, but give it freedom for offensive action. Even then its sphere of action may be limited, but if it cannot act offensively, it cannot act efficiently. For this reason, if for no other, our fixed coast defenses should not be transferred to the navy.

## SUGGESTIONS FOR CONSIDERATION, RELATIVE TO THE QUARTERMASTER'S DEPARTMENT, U. S. ARMY.

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I HAVE heretofore on two occasions read before the Vancouver Barracks branch of the Military Service Institution, papers touching on what seem to me vital necessities of our service. In the first of these papers I endeavored in general terms to point out some of the errors of administration into which, I conceive, we have fallen, and to direct attention to the subject in a general way, hoping thereby to stimulate special consideration, and thus aid in a reformation which seems to me most important.

In the second paper I sought to extend the scope of the first, and to show generally wherein existing methods of administration appear defective, together with some of the causes, and the direct results of such causes, and indicated how steps might be taken to improve existing conditions, in the direction of efficiency, economy and practical usefulness during peace, and hence to afford the best possible preparation for war.

Further than this I cannot properly go, so far as any other Departments of the service are concerned. But I may, it seems to me, with entire propriety, go beyond this in matters pertaining to the Department to which I belong, and discuss freely and dispassionately its organization, its purposes, its relations to other Departments and the line of the army, its efficiency, its defects, and wherein it appears to me it is susceptible of betterment, not only for the present but for the future, and especially for its expansion to the needs of the country for a war of any magnitude.

In doing so I approach the subject with a full realization of its importance; of the difficulties to be encountered, not only from the natural prejudice that clings to the old, and the distrust that attaches to the new, but also from the necessity of making the work fit into and harmonize with the existing order of things; and of the many obstacles that beset any effort to extricate an old and established system from its deeply worn grooves of error,

or from underneath its mass of unnecessary routine and circuitous methods.

Nor do I undervalue in the least what is good of the present system. All I shall seek to do is to strip it of the excrescences that, like barnacles on the bottom of a ship, impair its speed, and beget decay.

Nor yet are my suggestions aimed at any individual in any respect. The condition of the Department as we find it to-day is of long growth, and contains much, *very much*, that is most excellent. But, to my mind, it needs simplification in its regulations, forms and methods; greater plainness, directness and expedition in its operations; in short a clearer, stronger and better organization in conformity with the spirit of the times, in order to bring about the greatest efficiency, vigor and despatch in the transaction of its duties; conditions that are unmistakably of vital importance to the army at all times.

The Department needs to be shorn of all cumbersomeness of methods and stripped of every vestige of unnecessary routine, and the line and scope of the duties of its officers made clear, sharp and certain. No excuse should be left for indecision, inaction or delay in regard to any of the matters ordinarily arising either in peace or war. The experience of daily service in peace should be the best possible preparation for war, not only in the mere transaction of business, but in giving officers the comprehensiveness, grasp and confidence for the greatest emergencies likely to befall the Department.

A retrospect of the laws relating to the Department, from its organization in 1775 down to the present, and the discussions thereon, will best impress one with the importance that has been attached to it throughout, while the brief outline of its duties, as laid down by regulations, though a synopsis of the vast field of its operations, will yet convey but a superficial conception of its services and carry but little idea of the immensity of detail, range of knowledge, care, prudence and foresight necessary in the transaction of its business.

This outline of duties as set forth in the Regulations is as follows:

The Quartermaster's Department is charged with the duty of providing the means of transportation of every character, either under contract or in kind, which may be needed in the movement of troops and materials of war. It furnishes all Government animals employed in the service of the

army, the forage consumed by them, the wagons and all articles necessary for their use, with the exception of the equipment of cavalry and artillery. It furnishes clothing, camp and garrison equipage for the troops, the shelter and buildings for them and for the stores which they require, constructs and repairs roads, railways and bridges needed for military purposes, builds and charts ships, boats, docks and wharves, and finally, attends to all those matters connected with military operations which are not expressly assigned to some other bureau of the War Department. Subsistence, ordnance, medical and hospital (and other) stores are issued by other departments but the Quartermaster's Department transports them to the place of issue and provides storehouses for their preservation until consumed.

In addition to the foregoing the Department provides and maintains the military cemeteries, and attends to transportation for all of the executive branches of the Government when called upon, and makes up the accounts for such service.

If the possible and likely extent and ramifications of these various subjects be but briefly considered, the immense scope of the operations of the Department may be in a measure conceived, but it is only after many years of intimate association and experience that even its officers realize the practically unlimited extent of its agencies, and the varied knowledge demanded in conducting its affairs. For the officer must be thoroughly familiar with all forms of transportation, from the huge ocean transport and enormous capacity of railroads, down through all the gradations of smaller boats, and of wagon and pack trains, to the use of dogs and even human beings for carrying service. He must have a knowledge of animals, their capacity, endurance, and the food necessary for them; he must be well up in engineering and architecture. He must possess information regarding engines, pumps, machinery, metals, woods, leathers, paints, oils, hardware, stationery, and appliances of every kind and character whether of steam or hand power; as well as of all materials used in construction. He must know textile and other fabrics going to make up the clothing and equipage of the army. He must have good business knowledge and habits and a thorough acquaintance with the extensive routine of his department. He must be familiar with laws, regulations and orders and their application; and in addition to all this he should be a man of superior courage, patience, tact and suavity.

The Department may point with pardonable and even glowing pride to its achievements from its foundation to the present time, and to what it accomplishes daily. It has been governed

and guided by men of distinguished ability from General Miffin to the present incumbent, including the memorable names of Greene, Jesup, Meigs, Ingalls and Rucker. And there is no doubt that men of corresponding ability will come to the front for its management in all the future. With such a record and promise for the future, the Department need not be in the least apprehensive if it pauses for a space, surrounded by the blessings and advantages of peace, and calm in the possession of great power and influence for good, to survey its domain, learn its defects if any it have, ferret out any inconsistencies and incongruities if such there be, ascertain wherein, if at all, it be weak or imperfect, and apply any remedy that may be demanded. It is far better that reform shall come from within rather than from without, and be born of a full rather than any partial knowledge of facts, needs and environments.

Such reform must emanate from the highest source, and must spread from the top downward. The subordinate cannot govern the head any more than the branch of a tree can control the trunk.

In the consideration of the matter, I have not overlooked important existing conditions. When a machine runs well, it may be said that it is well to let it alone. But when it can be made to run better, produce better results, earn more money at less cost of operation, the owner would hardly be regarded wise who would not avail himself of such improvement.

Of course there will come the doubters and the fearful, with their uncertainties, incredulities and apprehensions as to the result of changes. There is ever a strong tendency to cling to the old established ways; for the many are accustomed to those ways and shrink from learning new ways even if better ones, and hence exert a strong majority influence. It is said that "long periods of time are required to establish on sure foundations any vital truth, but far longer periods are required to dispose of dead superstitions."

It is with these considerations that I venture upon the following suggestions in relation to the Department, based on long and varied experience and observation. They are the result of much thought and study of the needs of the Department and the measures adopted to attain the ends desired, and present what seems to me marked advantages over the existing system. They are not all that have occurred to me, but are the most promi-

ment, and seem the most worthy of attention. Some of them are not new and others but partly so. Others may differ with me, may have additional suggestions or better ones, or may improve on those herein offered. There may be reasons and obstacles against the proposed changes, unknown to me and hence not met in this paper. I have always held and urged that the experience of several is better than of one, hence, that reform and reorganization should be delegated to a number of the broadest, most progressive, and best experienced men of the Department, to whom should be given ample time, adequate clerical help and every facility for the best possible accomplishment of the task.

It is realized that some of the objectionable conditions sought to be remedied exist under the operations of law, hence it will become necessary to seek legislation to some extent to provide for reforms found to be essential; but it is believed that Congress will be found ready to meet any plain necessity, which the officers charged with creating any new system and familiar with every measure thereof, would be abundantly able to make apparent. Others are under stipulations of the Treasury Department, but I believe these too may be corrected and harmonized by friendly conferences, having benefits in view.

True, all this will demand large and comprehensive thought and great patience and perseverance, but he or they who shall undertake and accomplish the work will deserve and assuredly receive the grateful thanks of the army, and the endorsement of all persons actuated by broad and progressive public spirit.

In this age of progress the step forward is so easy that the step backward would be deplorable, and a perfect stand-still a confession of weakness betokening lack of study and originality.

In the suggestions I offer, I shall discuss the subject under two divisions,—first, as to administration, and second as to methods and forms.

#### ADMINISTRATION.

The supreme head of all direct control of the army is the President, who is, under the Constitution, the Commander-in-chief, and appoints and commissions all officers. He also in accordance with law promulgates the Regulations for the government of the army. His prerogatives as Commander-in-chief are usually exercised through the Secretary of War, who in turn controls the affairs of the War Department by virtue of specific



laws of Congress relating thereto, and governs matters relative to the military forces by such authority as may be delegated to him by the President, as set forth in Sec. 216, Revised Statutes. Under those two sources of authority the powers of the Secretary extend over nearly all matters connected with the military service.

Thus under law, regulations and orders issued from time to time, the administration of the affairs of the War Department and the army are carried out. And, though they are embraced under different titles in the Revised Statutes, they are so allied and interwoven that for all purposes of discussion they may fairly be regarded as one and the same thing.

The army is divided into the Line and the Staff, the former being the battle-giving power, and the latter providing under proper direction for control and supply. The Staff, in turn, to carry out its purposes, is divided into ten Corps or Departments, each with its chief in the War Department, who is held to be on the staff of the President and Secretary of War.

These Staff Corps or Departments are variously constituted, the subordinates serving either with the military commands, or on other duty, reporting directly to their respective chiefs.

It is to that one of these Staff Departments of which I am a member that I direct this paper for the purposes I have indicated.

The objects of this Department are set forth in the laws and regulations as already mentioned, and it will be manifest to any unprejudiced mind that to reach these ends in the simplest, most direct and efficacious manner consistent with the safety of money and property, should be the constant aim of all engaged in conducting its affairs. Wherein such is done, no person can fairly arraign existing conditions; but if in any respect they fall short of this, they should be positively and unhesitatingly remoulded to meet all requirements, vigorously, fully, and promptly, both of peace and war, so far as human study and foresight may be brought to bear.

The organization of the Department proper leaves little to suggest, save as to the door by which or through which its permanent officers should enter it. As it now is, it is by *selection* from the lieutenants of the line, or from civil life, and is largely affected by political and social influences. This will naturally and surely obtain unless Congress shall by law provide for appoint-



ments from such lieutenants as shall have rendered efficient services as regimental or post quartermasters, and shown marked aptitude and ability for the duty. This would at once stimulate young men so detailed to exert their best energies in the transaction of their duties, and would constitute a sort of automatic examination of their fitness, which should be attested by the joint evidence of their commanding officers, the chief of the department, and the Third Auditor of the Treasury. It is true there are many cases in which a man may be a most excellent outdoor quartermaster, and yet so constituted that he cannot conduct his office successfully, and *vice versa*, yet there are many men who can do both very efficiently, and it is of such that the Department should be made up.

Coming directly to the question of the administration of the duties of the Department, we find that not only general, but in a large measure, detailed control, is exercised from the Quartermaster-General's Office. That general control should remain there, and aggregated or summarized information exist there, no one will gainsay; not yet will it be denied that the examination of the accounts of its officers on behalf of the War Department should rest there. These conceded, it is submitted, that the larger share of the business of the Department should be delegated to its subordinate officers, always within well-defined lines and limits of action. And, lest it be asked how these lines and limits shall be laid down, an outline of them will be indicated in this paper.

For long, long years, from the foundation of the Government almost, down to about nine years ago, the authority delegated by Congress and the President to the Secretary of War was, in many respects, partly delegated in turn to commanding generals and other officers. So usual was this, so fixed by practice and precedent, that the older and newer regulations are full of provisions for the government of officers taking such action. I allude, now, more particularly to the question of expenditures. All at once it was held that the actual and direct authority of the Secretary of War was requisite in each and every case. Turning to the Revised Statutes we find that Sec. 219 requires the Secretary of War from time to time to define and prescribe kinds and amounts of supplies to be purchased by the Quartermaster's Department and the duties and powers thereof respecting such purchases, together with other requirements. So likewise does Sec. 220 state

that transportation of troops, munitions of war, etc., shall be under the immediate control of the Secretary of War and such agents as he may appoint. Sec. 1133 makes it the duty of the Quartermaster's Department, under the direction of the Secretary of War, to purchase and distribute supplies, etc. Sec. 3714 in substance reiterates the provisions of Sec. 219. These with the law of July 5, 1884, and subsequent laws of the same tenor, constitute the authority on the subject. Of course the Secretary of War may define and prescribe for each item separately, or he may group them by classes or under general rules. The law of July 5, 1884, was at first judged to be an amplification of previous laws, to be carried out by the same agencies. The provisions of Regulations now embodied in paragraphs 813, 814, 818, 822 and 826 were not modified. No general order, regulation or decision was promulgated that a new construction of the laws was to be enforced; it was brought about by rulings of the Department; and the time honored practice that had secured to the order of a commander the prompt and zealous obedience of his subordinate, in matters relating to money and property, became largely a matter of uncertainty both to the commander and his subordinate. The practice was instituted of forwarding all estimates for supplies and requests for authority for expenditures to Washington, so that each case is now acted on singly, involving not only delay but often long and vexatious correspondence about trivial matters. I have one such case in mind, where an expenditure for 1250 feet of lumber for a very remote post, involving an outlay of \$25.00, was, after being certified by a post quartermaster as being necessary for a use that seemed wholly proper, approved by a post commander, recommended by a chief quartermaster of experience, and approved by a distinguished general officer, returned a distance of five or six thousand miles over the signature of a very young captain for some trifling explanation. No one supposes that each case is directly acted on by the Secretary of War, hence the authority is delegated to some subordinate officer, and if it can be delegated to one, it may be to more than one.

I do not stand for a change that shall work any wrong or loss, and I recognize the need of firm control of the appropriations. But I cannot escape the conviction that this control, not only of appropriations but of administration, may be exercised in a general way from the Quartermaster-General's office, leaving to his

subordinates some share of responsibility and most of the detailed work. There is but one Quartermaster-General, and there are 56 subordinate officers of his department. Even with his five or six assistants he cannot hope to attend to all the detailed directions of his great establishment as to purchases, contracts, shipments, expenditures, etc. The work must be delegated, and is it not better to delegate and divide it under established rules, than to exercise it individually, with his office fairly groaning under a load too great for any officer to carry, and under which it must be crushed with the pressure of a great war. Under the existing practice subordinate officers unload largely on the head office, for the reason that doubt and uncertainty largely prevail. Were the duties of subordinate officers enlarged and made plain, their authority under most contingencies clearly set forth, their scope of action increased and defined, they would most assuredly gain in the grasp, confidence and decision so essential to military success, and with equal certainty relieve the head of the department. Ability, integrity, energy, zeal and economy exist so generally in the army that he who runs will brush against them on every side.

The safety of intrusting responsibility to subordinates need not be doubted. Most men are zealous to excel. Let the rules and principles of guidance be fixed and all will cheerfully follow. Safeguards must be set up and sustained, for there are always in every walk of life a few uncertain men. But in all wisdom let these safeguards be reasonable, strong and manful, not weak and trivial. Beget in men's minds the love of honesty by all fair and elevated treatment, and deserve by a lofty method the right to punish for misdeeds. Appoint men of known high character and superior zeal, energy and ability to the principal places; lay down the principles and rules to which their action shall accord; define the limits of their authority; set bounds as to expenditures by proper limit; give them full faith; and then hold them rigidly to account for any deviation. In this way we would relieve the head officer; give the chief officer time to study the greater objects of his department; get closer to the army and its needs; attain greater vigor, promptitude and general efficiency so essential above all else; and be ready for any emergency.

I think it will be admitted that there are complaints as to promptitude both in correspondence and furnishing supplies and means, which the Quartermaster-General, far removed from the

posts, possibly never hears and consequently cannot realize ; but those who are in closer contact, and hence more direct interest with the remote stations hear and are powerless to redress. It would be neither seemly nor dignified to go up with each of these, nor could they be understood in the aggregate, therefore would possibly be disbelieved.

I would urge then a general system similar in substance to the following outline.

The appropriations being under the direction of the Secretary of War and the Quartermaster-General, to be apportioned, first to the general needs of the army which can be quite accurately estimated ; secondly for reserve purposes to meet emergencies, such reserve to be held well in hand until toward the close of each fiscal year ; and thirdly to Military Departments and independent stations, in like manner as is now practiced in relation to appropriations for barracks and quarters, and incidental expenses.

The great bulk of certain supplies which can be ascertained with reasonable accuracy, and of which a surplus will not deteriorate, can always be used, and as to which uniformity is desirable,—such as clothing and equipage, stationery, stoves, ranges and their appendages, wagons and other conveyances, harness, all heavy or costly machinery, horse and mule shoes and nails, hose, leather, and other articles, when purchase in larger lots is likely to secure advantages in price,—to be purchased under the direction of the Quartermaster-General at the most advantageous points.

Fuel, forage and straw, being fixed by regulations, to be provided by chief quartermasters of departments and independent commands, under contract for all permanent stations, and by the most advantageous methods for temporary or moving commands.

In other respects the allotments to be disbursed under general authority of the Secretary of War, on duly approved estimates of the local quartermaster, recommended by the chief quartermaster, and approved by the department commander ; those for independent stations on like estimates of the quartermaster, approved by the commanding officer ; all within limits, not of amount which would be pernicious, but of law, regulation, necessity, custom of service and propriety, within such scope as might be indicated.

As a measure of restraint, if thought necessary, the Quartermaster-General could cause to be indicated in orders, from time to time, such articles as would not be allowed except by sanction

of his office. Thus, with prudent and experienced men as department chief quartermasters, there would be no mistakes, more especially if it were required that lists of all purchases or expenditures authorized be immediately forwarded to his office.

Administration and supervision are conceived to be the distinctive attributes of that office, and not the details of execution.

Lest it be advanced that it is considered unsafe or impracticable to delegate authority under the law as herein suggested, attention is invited to the fact that by Sections 219 and 220, Revised Statutes, such is specifically provided for, not only as to purchases but as to transportation, and is daily exercised as to the latter.

Second only to this question of delegation of the authority of the Secretary of War, is the delegation of the right to act in relation to such supplies for the army as are fixed by the regulations, and which from necessity and economy should be purchased within the territory occupied by a command.

As recently exercised, though seemingly not in conformity with A. R. 649, proposals for the regular and larger contracts, received, opened, and abstracted by subordinate officers, are forwarded to the Quartermaster-General for award. For the distant western stations this method imposes delays that are embarrassing to the quartermaster and injurious to the contractor. For to all contractors the question of certainty is of great consequence, and under long suspensions of decision he is restrained from action that might greatly benefit him, while his opponents in business are enabled to form harassing and damaging, if not ruinous, combinations against him. Any officer, at all familiar with the wiles of the western bidders and dealers, is well acquainted with this practice. The rules of procedure laid down, as they are, the reasons are not understood for taking this business of award from the department chief quartermaster, where the Regulations seem to place it, while the wisdom of leaving the Quartermaster-General's office as a court of appeal, so to speak, would seem most desirable.

There will exist much diversity of opinion as to who shall finally approve contracts, but there can be little doubt that it properly rests with the head of the department to which the contract pertains, after revision as to legal and technical requirements. But it does not appear necessary that time should be consumed both in forwarding the bids for award and the contracts

for approval under that award. If regarded necessary to compare lowest bids with total cost if purchased elsewhere, they might be telegraphed to Washington, and award sanctioned by telegraph. But it should be understood that the award and contract made should hold good until disapproval, which should be made only in extreme cases. The officer making the contract should be held responsible for palpable error, and not the innocent contractor.

I know it will seem that with our rapid mail facilities correspondence in relation to contracts should not prove obstructive, but experience proves that it is exceedingly so in very many cases, and works positive injury.

A comprehensive and reliable basis of purchases and expenditures thus set up, with certain distribution of authority, work and detail, all officers to be rigidly held thereto, I would next simplify our method of making the lesser purchases not under formal contract.

In a country like ours where the rights of all are to be carefully considered, competition is an essential feature. Existing law provides that this shall be obtained by "public notice of not less than ten days for small amounts for immediate use, and of not less than thirty to sixty days, whenever in the opinion of the Secretary of War, the circumstances of the case and condition of the service shall warrant such extension of time."

It will be manifest that the Secretary of War cannot give his personal attention to each and every case as to this question of time, hence it also is delegated to some subordinate officer who decides it.

It will not be controverted that the larger lots of supplies and services may be advantageously advertised for for a period of thirty days, thus enabling persons throughout the Union to enter into the competition. But such may well be confined to the regular supplies of fuel, forage and straw, for the established posts, the larger lots of usual supplies as before indicated, and the regular wagon transportation routes. For the lesser but yet considerable amounts, which from their extent are likely to attract the attention of dealers, the period of ten days, time and need admitting, may be held to. But for all the lesser amounts my observation and experience confirm me in the view that far better results are had from one to five days notice, while greater promptitude and satisfaction are secured all round.

It is a fact well-known to purchasing officers that the larger houses with extensive business are too much occupied with large operations to take up these lesser matters and keep trace of them throughout our somewhat slow and circuitous method of making purchases, and as a result we deal largely with the smaller houses and middle men, hence do not realize the lowest prices possible. If, on receipt of an invitation to make a proposal on a lot of stores, the dealer can answer at once, with the assurance that the award will follow immediately, in time to enable him to avail of the then state of the market, he does not hesitate.

But when the award is to follow in a period of 12, 15 or 20 days, he apprehends a possible change of the market and defers action, and possibly forgets all about the matter by the day the proposals are to be opened. Promptitude and celerity are the chief essentials of business success in these days of light profits, and firms rely largely on volume of business for adequate returns, hence the desire to dispose of all matters without loss of time or too great a demand on the services of expensive employes. By dint of care and courtesy on the part of the purchasing officer he is enabled to hold the competition of some of the larger firms, but the eagerness of dealers in general which usually follows trade in all directions, is turned aside as to small lots by the delay and circumlocution of our methods, which can be, and in my opinion should be simplified and made easy and plain. A good deal less paper work and a fairer degree of faith in the officer will achieve wonderful results.

The number of papers connected with purchases demanded by our system is excessive, and may be reduced without in any respect lowering the point of safety to the Treasury. Papers that serve no use, or a trivial purpose at most, should be dispensed with. It is known that this requirement has its source in the Treasury as well as in the War Department. First, a number of papers is demanded for the satisfaction of the latter, and second, a similar lot for the satisfaction of the former. Why cannot a system be devised whereby the satisfaction of both may be assured with one set of papers? Or, why cannot the Treasury Department be satisfied with the revision by the War Department of authorities, methods and details, reserving to itself the determination of correctness and conformity with law?

As it is, the examination of the Treasury Department is



largely the reiteration of the examination of the War Department under War Department rules, orders and decisions.

Take for instance the case of small forces in the field, say a cavalry detachment in pursuit of Indians in Arizona, where wood, forage and water are scarce. Rapid movement is clearly of importance. And yet the commanding officer, possibly without a single man who can write, as has often been the case, is required to sustain his purchases, the shoeing of his animals or the repair of his transportation, with papers enough to be a burden to his movements. Yet the field is preëminently the sphere of a soldier, and all his training should tend to his effectiveness there. How vital then the need to free him from every embarrassment of every kind in the presence of an enemy. The simple certificate of an officer that his command was on detached service; that the mode adopted was the most advantageous one possible; that there was not time to obtain proposals, and that the supplies could not be obtained from any established station; added to the certificate of the vouchers generally used, should pass the account as far as method of purchase is concerned. Then, too, the requirement that original bills shall accompany the account is impracticable in nearly all such cases, and secures no result. Many of these remote ranchmen can neither read nor write, and frequently they are without paper and ink. Nor is it seen that this requirement is essential in any case. What safety does it beget? Does any one suppose that a creditor would not make an original bill to conform to any voucher he would put his signature to? Even the rude, horny-handed, sunburnt, weather-beaten sons of the plains, prairies and deserts, laugh at this, while it is positively ridiculed by the more advanced and alert merchant and manufacturer.

There is a case on record where correspondence across six thousand miles was carried on in regard to a purchase amounting to one dollar and a half. Is it dignified, is it manly, is it soldier-like, is it in accord with the spirit of the nation or the times, to conduct business matters in such fashion? Why, the latest clerk in a country store would be allowed enough latitude for making an expenditure of that amount, let alone generals, colonels, majors, etc., holding commissions from the President of the United States, wherein it is stated that "special trust and confidence are reposed in their patriotism, valor, fidelity and abilities."



I feel I cannot urge too strongly the reformation of administration that imposes such conditions as to the transaction of business.

Periodical reports of posts, departments, etc., as to certain articles, such as means of transportation, fuel, forage, water supply, employes, extra duty men, tentage, etc., may be reduced in number by the adoption of compact forms, and made uniform everywhere. One or two blanks could be made to embrace all that would be needed from posts, and these, consolidated at department and independent headquarters, would afford the information necessary for reference at the Quartermaster-General's office.

Time and space forbid further suggestion here, though it arises on many sides. But I cannot avoid the conviction that in some such manner as I have indicated, and in regard to the matters referred to, as well as others of lesser moment, the administration of the Quartermaster's Department may be profitably improved, and a forward step made, whereby greater excellence and efficiency may be reached.

#### METHODS AND FORMS.

It is here that a veritable host of matters of more or less weight comes up to claim attention, some of which are of too little importance to be embraced in a general article, yet the aggregate of which is of sufficient magnitude to demand the most earnest consideration. I shall therefore now content myself with a mention in a more or less general way of the more prominent points that appear susceptible of improvement, leaving the detailed presentation of the whole to be made at some future time to the Quartermaster-General. In this way I avoid dry details and arguments in favor of simplification of methods and forms throughout, and present only the more salient of the reforms which appear necessary, the advantages of which are deemed manifest, and which it is believed are of sufficient prominence and interest to claim the attention of the army in general.

*Purchases under Proposals.*—Administration in regard to purchases having been already treated of, it remains only to speak of methods in detail.

It is now required that an abstract of bids and one number of each bid received shall be filed in the Quartermaster-General's office, in all cases when formal contracts are made. But in cases

of informal contract, the provisions of A. R. 715 are made to apply, under which the purchasing officer forwards only accepted bids. To my mind this latter practice is defective, for the revising authorities do not see the other bids and hence cannot judge the action of the purchasing officer. I favor the plan of filing in the Quartermaster-General's office an abstract of the bids and one number of each bid, in all cases, with the action of the purchasing officer noted thereon; this abstract to have attached to it the required copy of the advertisement, certificate of publication, and certificate that the award was made to the lowest responsible bidder for the best and most suitable articles; the notes of award to do away with copies of letters of acceptance. Thus a complete history of the case would be in the hands of the Quartermaster-General with the fewest papers, and the vouchers could be made up with the least delay and trouble and without a mass of attendant papers, on forms prepared for each method of purchase, which should be the simplest to meet the lowest possible limit of requirement.

It is not perceived why the revision of all bids is so essential in the case of formal contracts though the amount involved be comparatively small, and not in case of informal contracts even though the amount be quite large. It would seem that the system of purchases should be uniform throughout.

If necessary to make the informal contract clear to the Treasury Department, the abstract with proposals, with acceptances noted, could be forwarded with the accounts to the Treasury Department after sufficient examination in the Quartermaster-General's office.

*Weekly and Monthly Statements of Funds.*—This paper, involving much time and work, could in my opinion be wisely dispensed with. Born in a moment of agitation over a great defalcation, it has cost the Government a great deal of valuable time, vast laborious examination in the aggregate, and tons of paper, and has not, so far as I am advised, been productive of a single beneficial result. Cannot officers be safely trusted one short month, at the end of which they are required to render their accounts, supported by vouchers, and will not these if promptly examined afford a better safeguard than a mere statement?

*Property Returns.*—It is my settled conviction that the actual needs of the service will be better met by a property return twice a year instead of four times. During the winter season opera-

tions of all kinds are in the main suspended. A property return on the 31st of March would show what was available for the summer operations. With this in hand the chief quartermaster of the department should be able to keep trace of the supplies at a post. A like return on the 30th of September would indicate what was on hand for the winter.

The inventory required at the end of each quarter demands much time and work. It is questionable if it be possible for post quartermasters to take it accurately as frequently as now imposed, with the limited force at their disposal. It is believed that it is amply sufficient that the return and inventory be made twice a year, and when making transfers of duties. Scarcely any business house takes stock more than once a year.

Experience and an examination of certain classes of property returns will indicate about the average list of articles at posts and depots. From this about three classes of returns could be devised with the headings printed in, a few blank spaces being left at suitable intervals for irregular and unusual articles. Every body would get familiar with such returns and conduct matters connected with them with greater dispatch. They would also afford inexperienced officers information as to the classification of stores. That this is practicable is shown by the stock reports of the general depots. There is a vast amount of writing in the headings of returns and abstracts. The saving of work from these changes would be enormous.

*Estimates for Quartermaster's Stores.*—An examination of our form for these estimates will disclose that it is somewhat elaborate, but I do not see that it can be simplified and yet afford the revising officers the information requisite for their action. I think, however, one copy of the estimate in detail sufficient, to be accompanied by such number of corresponding lists of stores to be supplied thereon as may be necessary for file at department and other headquarters.

*Forms of Requisitions for the issue of Regulated Supplies.*—These forms may be simplified by combining the certificate and receipt so as to require but one signature. And as all the supplies issued on these forms are fixed by regulations, and the full allowance may be drawn, there seems no actual necessity that they shall be in duplicate. No adequate reason is perceived why they may not be used in the same manner as the provision return is in the Subsistence Department. The certificate should include

all the facts requisite and thus constantly present them to the officer receiving the stores.

*Invoices and Receipts.*—Twice have I presented a proposition to do away with one number of the duplicates of these papers, as now used. At first glance it will seem that it cannot be done without danger, but a more careful study will, I think, dispel all apprehension.

To understand this question better it is well to present first an outline of the course these papers pass through in settlement.

The abstracts E and K are compared with the respective vouchers, and the invoices and receipts comprising such vouchers are compared with the corresponding receipts and invoices in other officers' accounts.

It will be apparent that the invoicing officer will certainly take credit for all stores transferred, hence the receiving officer must charge himself with all received or the discrepancy will at once be found. It can be found as well by the comparison of abstracts as of vouchers. Hence but one copy of invoice and receipt is necessary, to be held by the respective officers for their guidance and protection in case of dispute. In case of boards of survey the proceedings to be filed with the abstract to which they relate. I can see no reason why the abstracts of officers cannot be compared as to articles and amounts as easily as vouchers. By this plan a vast amount of writing would be saved, the mails would be relieved, and the enormous amounts of papers stored in the Departments at Washington greatly lessened.

*Standards and Allowances.*—The establishment of standards of excellence for guidance during the past has been of great service, and may be extended advantageously. For instance, a great many grades of stationery are supplied, sometimes a poorer class sent to distant posts, while a better one is used at central points. A suitable grade for the public business in general being decided on, the supply would be uniform. I think the allowances of stationery may also be placed on a better footing.

*Barracks and Quarters.*—Great as has been the advance in these matters during the past fifteen years, there is yet room for still further advantageous steps.

The time is here when greater uniformity of plans and excellence may be adopted, without in any degree trespassing on the dangerous ground of luxuriousness.

The army is passing through a transition state from the guar-

dianship of the Indian frontier to the greater guardianship of the whole country ; from the condition of scattered scouts to that of a compact, well organized and disciplined body for battle with civilized nations. Troops will hereafter be assembled in larger bodies and at permanent stations, to be selected according to the necessities that may appear to those in high authority. Undoubtedly such selections will, as a rule, be on railroads or on navigable waterways, that the cost of transportation may be the least. As a measure of economy, buildings will be constructed only for durability, healthfulness and a proper degree of comfort. Costly architectural display will not be sanctioned, nor yet luxurious appointments. Good, substantial, commodious, homelike buildings will accord best with the public view.

To secure such, it is thought that plans, uniform in the main as to accommodations, appointments and finish, should be prepared in the Quartermaster-General's office, the variations for climate to be considered. These plans should be for construction either of stone, brick, frame or adobe, with bills of materials and full specifications for each.

Several sets, somewhat varied, of plans, specifications, etc., might be made for quarters, barracks, storehouses, etc., of various capacities, each to be designated by number for reference in estimates and correspondence.

By this means some uniformity in accommodation might be reached and a great deal of harassing perplexity be saved, especially to inexperienced quartermasters, who are often called upon under the present system to make plans and estimates and specifications without knowledge of or access to approved plans and with crude ideas of the whole subject, thus leading to great diversity, inequality, and the construction of poorly planned, badly built and imperfectly finished structures.

And while on this subject of quarters I would strongly urge a rearrangement of allowances. As now set forth they are in no wise, save as to commutation, conformed to. Once I proposed to an eminent officer that the allowance should be increased, and was met by the observation that it could not be done on account of the commutation allowance. It reminded me of the sailor who could splice a rope if too short, but had no idea what to do in case it was too long.

As a matter of fact, neither the allowance of rooms, nor the commutation therefor are commensurate with the actual needs of

officers, or the station in life they are expected to maintain. As to the allowance of rooms the regulations are a dead letter, for no officer, even at the most remote and illy provided station, is restricted thereto. Everywhere quarters are afforded largely in excess of the schedule, which was fixed at an early period in the history of the country and has not been revised to meet the advanced conditions of the service and of society. Who, now-a-days, expects officers to live in the number of rooms named in the table of allowances? No one. Why then retain this fiction of the regulations, and why not readjust the allowances? Does the commutation bugbear rear its head in the way? If so, why not readjust commutation also? It is notorious that no officer can rent suitable quarters for the amount of his commutation, hence he is compelled to reach down into his pocket and pay for what the Government has agreed to furnish.

Will any one deny that to maintain the state of a modest gentleman, a second lieutenant should have at least a sitting-room, a dining-room, a kitchen, a bed-room for himself and a bed-room for his servant? Will it appear in any degree excessive if for each grade of promotion one additional room be added? And will it appear excessive if on this basis eight dollars per room be fixed as a fair commutation rate? It is not believed that houses of the sizes indicated can be rented for less rates, if for these, in any of the larger cities of the Union.

And, inasmuch as officers at posts are supplied with stoves, why should officers ordered to duty in cities be denied them?

*Army Transportation.*—In this direction it seems to me that a number of most desirable reforms may be inaugurated.

Under our present system, owing to the several conditions of bond-aided, land-grant and pay railroads, a number of bills of lading covering one shipment have to be made in many, I may say the majority of cases, especially so in cases of shipments over the longer routes. These bills of lading under existing decisions are settled upon at through rates, separation being mostly for the convenience of the railroad companies, thus entailing extensive additional, and, as I conceive, unnecessary work in the Department. I do not see why one through bill of lading, with route specified thereon, cannot be made to serve in all cases, settlement to be made with the last carrier at through rates, in cash for all pay roads, and certificates for all bond-aided and free roads. If any legislation be needed to secure this, it is believed

that it would be afforded. Or, if preferred, for any reason, the disbursing quartermaster could make up and certify accounts for each road involved, by reference to bill of lading where filed. A like course could be adopted as to transportation requests, for all routes over which tickets could be procured.

For the movement of bodies of troops over long transportation lines, adequate and fair regulations should, in my opinion, be made as to sleeping car accommodations under all circumstances likely to arise. No officer or soldier should be required to make journeys involving night travel between 7 o'clock P. M. and 6 o'clock A. M., beyond five hours, without sleeping-car accommodations.

I favor an allowance of strong, well-made, suitable packing boxes for companies, to be used for change of station and for the safe keeping of company property at posts, to be borne on the company return of quartermaster's stores, such allowances to be fixed after thorough examination of the subject. And this should lead to greater uniformity in amounts of company property and baggage. It is a strange fact that one company will have double the amount of another. A maximum amount being fixed (exclusive of weight of boxes), proper accommodation would be afforded, with all excess eliminated.

And this brings me to the matter of allowance of officers' baggage, which I have always believed to be singularly inadequate. I have before presented at length my views on the subject, but in a *résumé* like this it seems proper to recur to it. It is my belief that a fair and moderate estimate of the reasonable baggage of officers would be just about double the present allowance.

The transportation of officers' horses is now limited in total cost of fifty dollars each, including cost of transportation of an attendant. By this fixed limit an officer who makes a short change of station is enabled to have his authorized horses transported and properly cared for, while the officer who is ordered to a greater distance, and presumably at greater personal cost and hardship in other respects, is compelled to pay the additional cost of transportation, often amounting to a considerable sum. When it is considered that mounted officers are required to keep their authorized horses, and that a forced sale must always be at a marked sacrifice, this provision works great inequality or oppressive loss. A fair allowance would seem to be one based on principle and not on fixed amount.



All officers and men change station as a rule at the instance of the Government, hence, in all justice, it would seem that reasonable liberality should be exercised toward them, so far as such may be done within the requirements of law and equable administration as between the Government and the individual.

Further, inasmuch as the home and family are the foundations of society, and as in the natural order of things, men gather round them families and belongings, which, in the case of the soldier, he must take with him or abandon ; and as he moves from station to station at the order of the Government ; and as under the interstate commerce law the United States reserves to itself the right to obtain special rates for their passengers and freight ; it is earnestly thought that a due representation of the facts by proper authority would induce Congress to extend the provision as to special rates to the families and extra freights of officers and soldiers changing station under proper orders.

*Clothing and Equipage.*—My experience as chief quartermaster of several Departments leads me to offer the following under this head.

In spite of precaution, and in part owing to changes of commands, clothing and equipage in excess of needs will accumulate at posts. At the period of making the yearly estimates, every effort is made to absorb such surplusage by using it where needed. Notwithstanding these efforts, considerable surplus exists at most posts, with inadequate means of taking care of it, and possibly scant storage room. Frequently, when stores are sent from post to post, selection is made of the poorest, and generally the result is unsatisfactory. As the general clothing depots are centrally located, I believe it will be little more expensive to ship surplus stores thereto, where they can be gone over, cared for, distributed, repacked and shipped to posts without dissatisfaction to any one, than to seek to absorb the surplus by distribution to other posts. And I believe that the increased cost, if any, is recompensed by a saving of clothing. In other words, it is better that surplus shall exist at few available places, rather than at many unavailable ones.

Rapid transportation to nearly all posts being now easy and available for the entire year, I believe a modification of existing regulations as to supplying clothing may be profitably adopted.

The existing system of annual estimates, to enable the Department to provide the necessary clothing, appears excellent, but



I am inclined to think that the limit of increase over the authorized clothing allowances to provide for contingencies, is too large in the aggregate.

But the wisdom of shipping the entire annual allowance for a post at one time is exceedingly doubtful. I would rather make the annual estimate the basis of allowance and supply, shipments to be made on calls of posts,—quarterly, or oftener in case of need. In this way surplus at posts and consequent deterioration would be avoided, unnecessary transportation prevented, storage at posts relieved, supplies better cared for, and fewer articles become obsolete.

It goes without saying that sufficient of the articles needed in active campaign should be held at posts.

*Employés.*—It is thought that greater uniformity may be reached as to classification of employés and rates of pay. Men leave one officer and go to another, because of difference of pay. Others hear of such difference and grow dissatisfied. I believe it would prove beneficial to provide that the force of mechanics, laborers and teamsters, for permanent duties of the Department, should be enlisted and suitably uniformed, thus bringing them fairly under the rules and Articles of War; the rules of enlistment and discharge to be largely within the hands of the officer under whose charge they may be required to serve.

*General.*—I regard it most essential that the most ample supply of water be provided at all posts likely to be permanent for a number of years to come, and that the water systems be put on the most improved basis; also that the best sewer systems that can be devised shall be established and carefully kept in good condition. Comfort and healthfulness depend so much on these provisions that the largest liberality may be well exercised in regard to them.

The accumulation of unnecessary supplies should everywhere be avoided by constant watchfulness of post and chief quartermasters, aided by the scrutiny of inspecting officers.

The day is at hand when gymnasiums, and drill and riding halls have become a necessity, and these should also be constructed according to well devised, approved, general plans.

In the expenditure of public money strict accountability and due economy are always demanded at the hands of each and every officer connected therewith, but it is to be borne in mind that there are such things as over-burdened accountability and false

economy. To the former, as far as seems proper, I have addressed this paper, but a word as to the latter may not be out of place. Granting that saving may be made by pinching economy, I submit that error in that direction is second only to that of extravagance. The expenditures of peace are not wholly for peace times. If they were, the army might well be disbanded. But the army is a training school for war,—a nucleus for the safety of the nation around which the greater military force of the country may gather for organization, support and direction in case of need,—and the money expended upon it is but put out at interest, so to speak, with the expectation of adequate return at some future day. To this end the moneys appropriated by Congress may fairly be used. That such is the intention and expectation of that body will scarcely be denied. Of course, money must not be squandered. But to give officers and men a reasonable degree of comfort, within the limits of the appropriations, and to advance the interests and effectiveness of the service in every way, would seem a proper use of *all* the moneys Congress is willing to afford.

No system should be upheld, and no economy practised that are in any measure obstructive or oppressive. Any system must be imperfect which all agree must be largely abandoned with the firing of the first hostile gun. Economy becomes excessive when it opposes advancement and effectiveness.

We do not educate soldiers in tactics for peace, and adopt other tactics with the declaration of war, nor should systems be practiced during the repose of peace that need to be changed when the confusion and excitement of war confronts us.

Chiefly does it seem, that the Quartermaster's Department may be benefitted by some measure of decentralization, a diffused and plain administration, the simplification of methods and positive relief in the matter of papers, and these measures should in my opinion, be pressed by all proper methods, which opinion is, I believe, entertained by a large majority of army officers.

As I have often said, not the views of any one officer, but those of a number of the most earnest, comprehensive and progressive ones, should be sought, and these grouped, harmonized and worked into the best shape, for the present and future, for peace and war, for the best ends at all times. This, the army and the country have a right to expect, and especially for any particular department of the service, from those charged with the duty of managing such Department.

## REMARKS UPON THE ORGANIZATION OF THE ARMIES OF EUROPE.

BY CAPTAIN J. J. O'CONNELL, 1ST U. S. INFANTRY.

(Continued from JOURNAL No. 67.)

THE FRENCH ARMY (*Concluded*).

### CAVALRY.

THERE was a time when the French cavalry was a most important factor in the game of war, when the chivalry of France rode to battle and the despised foot soldier took a very subordinate part in the profession of arms. That epoch has long since passed, and under present conditions of warfare the cavalry is relegated to second place, and the foot soldier bears the brunt of battle.

French cavalry has always been conspicuous for gallantry, if not always for efficiency. Napoleon had a fine body of cavalry and used it to the best advantage, gaining some of his signal triumphs with that arm. He and all great military leaders considered cavalry the "Arm of the instant of time"; and that "the greatest crime of a cavalry commander is inaction, which is infamous."

History records few examples of bravery more brilliant than that of the French cavalry at Woerth and Sedan. On the afternoon of the last named eventful battle, the Margueritte division of cavalry, in support of the hard pressed Seventh Corps, charged the 43d infantry brigade, which was supported by the flank fire of Prussian batteries. It wavered, broke, reformed and charged, eleven times under the withering fire of infantry and artillery, two squadrons of the 1st cuirassier regiment succeeding in cutting their way through the Prussian infantry. In this famous charge, Generals Margueritte, Girard and Tilliard were killed, and General Fenelon severely wounded. General de Galliffet, who assumed command when General Margueritte had fallen, was taken prisoner, and 50 per cent. of these brave horsemen were killed or wounded. The renowned cavalry of the great Frederick, led by Seydlitz, one of the greatest cavalry leaders that ever lived, performed nothing more daring—and yet it effected nothing.

The autumn manœuvres of 1891-92 have satisfactorily demonstrated that the French cavalry of to-day is worthy of its high traditions. Three cavalry schools contribute to this excellence, viz.:—Autun, Rambouillet and Saumur. The latter is the great cavalry school in France, and will bear comparison with any similar school of application in Europe. It has accommodations for 2000 pupils, and there are always about 600 subaltern officers present for instruction. Saumur aims to give its officers a comprehensive and practical insight into the various branches of their profession and the multifarious duties of a cavalry officer.

The term of instruction lasts two years, and the students are divided into 5 classes, viz.:—1st, officers of the cavalry and artillery regiments who volunteer for the course. 2d, lieutenants who have served a year with their regiments. 3d, sergeants of cavalry and artillery, especially those selected for promotion. 4th, corporals, one from each cavalry regiment, selected on account of their aptitude for horsemanship and intended for promotion. 5th, cavalry scholars,—men who wish to join the cavalry regiments,—who on passing a satisfactory examination are drafted into the army with the rank of corporal. The school is under the direct control of the Minister of War, with a general of brigade in immediate command. Saumur graduates a generation of cavalry officers whose proficiency commands the admiration of unprejudiced military judges. I have witnessed some superb feats of horsemanship in the riding hall at Saumur, but I have not seen more expert horsemen anywhere than the class of '92 in the riding hall at West Point during the graduation exercises. The horses at the French school are tame in comparison to a few of the vicious kickers I saw at West Point, to mount which while in motion was manifestly dangerous to life and limb.

General de Galliffet and men of his school have made their influence felt in the formation and training of the cavalry. They have evoked a spirit of enthusiasm which is evinced in the spirited activity and earnest endeavor displayed in every department. Even competent German critics admit the great advancement of the French cavalry during the last ten years.

The average age of officers in this arm is,—Division generals 60; brigadiers 58; colonels 54, and captains 40. It would be an improvement to put the limit of age in the different grades lower, for, of all arms, the cavalry should be commanded by young officers.

The recent manœuvres showed that the greater part of the officers of all grades possessed the spirit, freshness and strength that the dashing profession of a cavalryman requires. The youngest cavalry colonel is 44 years of age.

*Organization.*—The strength of cavalry units except the Spahis on a peace footing is :

|                                      | Officers. | Rank and file.           |
|--------------------------------------|-----------|--------------------------|
| Troop                                | 5 or 6    | 150                      |
| Regiment                             | 45        | 185                      |
|                                      | Spahis    |                          |
|                                      | Officers. | Rank and file.           |
| Troop                                | 7         | 178                      |
| Regiment                             | 55        | 1,104                    |
| The approximate strength in war is : |           |                          |
|                                      | Officers. | (Fighting Force)<br>Men. |
| Troop                                | 6         | 149                      |
| Regiment (4 Troops)                  | 32        | 612                      |
| Brigade (2 regiments)                | 67        | 1,228                    |
| Division (3 brigades)                | 216       | 3,707                    |

and 18 guns

The regiment has a colonel or lieutenant-colonel and major; an adjutant major (captain), standard bearer (lieut.), surgeon-major, 2d class, assistant surgeon-major, paymaster, clothing officer, assistant paymaster and 3 veterinary surgeons. Three adjutants, an adjutant (baggage master), trumpet sergeant, trumpet corporal, and chief armorer.

A Troop of 150 is divided into 4 platoons, forming two ranks 4.92 feet distance from head to croup. The ordinary interval between troops in line is 15 paces, and that between ranks is two paces in closed ranks, and 7 in open ranks,—two platoons form a division or section and each has 12 files front.

*Armament.*—Germany having adopted the lance as the arm of its cavalry, all other European powers must of necessity follow suit, although the French did so very reluctantly, preferring the time-honored sword; hence it is that only the front rank of the 14 dragoon regiments forming the cavalry division is armed with the lance, and the rear rank retains the sword. Only two members of the military commission were in favor of arming all with the lance.

The Cuirassiers wear in the field a cuirass weighing from 13 to 16 lbs., and are armed with sword and revolver. The other regi-

ments are armed with carbine and sword; the one is always carried over the shoulder and the other is attached to the saddle. Officers, sergeants and mounted pioneers are armed with revolvers. The carbine used is the Berthier, cal. 30.

*The Cavalry Attack.*—The attack of infantry by cavalry is not generally attempted unless infantry can be taken unprepared. The attack is made simultaneously in front and on the flanks if possible. The attack of masses of artillery is encouraged, especially when they are on the move, or coming into action; and is made in front in open order, and on a flank or in reverse in closed ranks. Artillery with a cavalry division is allowed great latitude in taking up positions in its support. As a general rule such a position is sought 300 to 400 yards in front, or 250 to 350 on the flank of the 1st line not exposed to the enemy's attack.

The division is the fighting unit of cavalry and is generally formed in 3 lines, viz.: the cuirassier brigade in the 1st line, dragoon brigade in the second and the light cavalry brigade in the third. The 2d and 3d lines are in échelon in rear of the two flanks of the 1st line, viz.: the 2d line at about 250 yards, the 3d, 350 yards. The 1st is the line of attack, the 2d the line of manœuvre, and is intended to assist the 1st especially by engaging the enemy's 2d line; the 3d, the reserve line, under the direct command of the general commanding, and its object is to reinforce the other lines and to meet any emergency that may arise. Its advance is covered by patrols, consisting of an officer or non-commissioned officer and two or three picked men, and it is immediately preceded by grand scouts. In first forming for attack the artillery marches 160 yards behind the 1st line. It leaves this place for a firing position on the flank, when the divisional commander has decided his plan of attack, and he at the same time places two troops at the disposal of the commander of the 1st line to occupy the position vacated by the artillery. These are to fill up the gaps in the line when the charge is made.

The rates of gait are from 109 to 121 yards a minute (according to the kind of country), at a walk; 261 yards per minute for all cavalry at a trot; and 371, which can be increased to 481 yards per minute at a gallop.

It is laid down as a principle that the uniformity of gait, whatever it may be, must always be maintained,—its speed should never be accelerated. If the troop is at a trot and haste is needed, the gait should be a gallop.

The distinctive colors in the cavalry are,—dark blue for the 1st troop, crimson for the 2d, dark green for the 3d, sky-blue for the 4th, yellow for the 5th, and orange for the 6th when there is one.

#### ARTILLERY.

The disasters of 1870 sobered French levity into something like gravity, and dissipated its vainglorious spirit into thin air. The tottering republic, dazed by the magnitude of its reverses, found itself in possession of large numbers of worthless guns and artillery material, which cost the nation an immense amount of money without the expected return of efficiency. A new order of things sprang up on the ruins of the old and effete system. The artillery was reorganized and the steady and determined purpose of the French Government during the last twenty-two years has been to perfect this important arm of the service, while promoting the martial spirit of the army and developing the military spirit of the people.

The field guns are of the pattern of 1877, of steel, breech-loading on the "de Bange" system. By the adoption of this system, improved in its details by Canet, especially in rapid firing guns, the French artillery will concede superiority to none in power, mobility, range, accuracy and efficacy. The French use *mélanite*, which gives tremendous force to the projectile.

France and Germany are constantly on the alert to discover an improved field gun to which their present guns may be changed. This is the prominent question of the hour in artillery circles. French artillerists recognize the principle that concentrating the fire of masses of artillery is the most effective method of its employment in battle. The drill regulations of this arm therefore tend to the development of this principle.

With the new explosive and destructive effects of modern improved artillery this branch of the line will not be, as heretofore, only a powerful auxiliary in gaining victory, but a prime factor in that achievement. In this connection the improved range and qualities of small arms do not seem to be of the importance claimed. If whole brigades can be annihilated at 2000 yards by the concentrated fire of massed artillery, what is the use of the infantry long-range rifle?

*Heavy Guns.*—Siege and fortress artillery embrace guns of the following calibres:—9.5 cm., 12 cm. (model '78), 15.5 cm., 15.5 cm. (short, model '77), mortar 22 cm.



Weights of their respective projectiles:—10.9 kg., 17.8 kg., 40.91 kg., 98 kg.

Coast guns are of the following calibres:—27 cm., 24 cm., and 19 cm. Weight of respective shells:—180 kg., 120.5 kg. and 76.7 kg.

*Field Guns.*—The modern French field guns may, perhaps, be better described as enlarged rifles, for that is what they really are. The ammunition, like rifle cartridges, of one piece only. Ignition is produced by a ready fuse, and the four kinds of projectile at present in use, *i. e.*,—shell, explosive shell, shrapnel and grape shot,—give place to a uniform projectile, an explosive shell, possessing the combined characteristics of shell and shrapnel. Thus the possibility of a gunner mistaking in the heat of battle one projectile for another will be averted, while the loading, aiming and firing, besides being quicker,—for the new arm is loaded and fired in one-third of the time required in working the old gun, and the effect and precision are almost double,—will be surer and unattended with danger.

The following table describes the guns in present use :

| Name of Gun.  | Weight of    |                   | Muzzle Velocity.<br>feet | Range,                                      |                         | Height of Axis of<br>Trunnions above<br>the Ground.<br>feet. | Powder Charge<br>(Weight).<br>lbs. | Shell with<br>Double Action<br>Fuse. |                              |
|---|--------------|-------------------|--------------------------|---|-------------------------|--|------------------------------------|--------------------------------------|------------------------------|
|   | Gun.<br>cwt. | Carriage,<br>cwt. |                          | Accords<br>to<br>Range-<br>Table.<br>yards. | Sighted<br>to<br>yards. |  |                                    | Common<br>Shell<br>(Weight)<br>lbs.  | Shrapnel<br>(Weight)<br>lbs. |
| 80 mm. (Horse<br>Artillery—3.149<br>inch calibre).                                  | 8.36         | 10.43             | 1,607                    | 7,655                                       | 6,313                   | 3.64   | 3.3                                | 13.15                                | 13.84                        |
| 90 mm. (Light<br>Ar'ty — 3.543<br>inches calibre).                                  | 10.43        | 13.38             | 1,492                    | 7,655                                       | 6,233                   | 3.93   | 4.18                               | 17.98                                | 18.51                        |
| 95 mm. (Ar'ty of<br>Position and for<br>Sorties, etc.—<br>3.740 inches<br>calibre). | 13.77        | 14.76             | 1,452                    | 7,655                                       | 6,014                   | 3.51   | 4.63                               | 24.71                                | 23.36                        |
| 80 mm (Moun-<br>tain Artillery—<br>3.149 inches<br>calibre).                        | 1.97         | 3.15              | 842                      | 4,374                                       | 3,390                   | 2.46   | .88                                | 13.16                                | 13.84                        |

The 8 mm. Maxim mitrailleuse fires 600 shots per minute, although 250 per minute is considered the limit of utmost effectiveness, and can keep that rate up for 9 minutes if required. Its

weight is 11.5 kg., and with 2000 cartridges is drawn by one horse. The gun has been found serviceable after having fired 30,000 cartridges with smokeless powder. Cavalry divisions and mountain troops are supplied with this arm or similar rapid firing guns. The 74 mm. rapid fire gun has recently been adopted. Weight of shell from 5 to 6 kg., rapidity from 10 to 12 shots per minute.

*Organization.*—Composition of a regiment of light artillery. Colonel, lieut.-col. and major. Five chiefs of battalion, a surgeon major, 1st class, instructor of equitation (captain), adjutant major (captain), paymaster (captain), clothing officer, assistant paymaster (lieut.), veterinary surgeons, 1st, 2d and 3d classes, three adjutants, a chief artificer, chief mechanic (sergeant), a sergt. trumpeter and a corporal trumpeter.

A battery has a captain commanding, a captain, 2d class, one 1st lieutenant and two 2d lieutenants, an adjutant, a chief quartermaster sergeant, eight quartermaster sergeants, a sergeant farrier, a corporal farrier, seven corporals, five artificers, four workers in wood and iron, a corporal master blacksmith, an assistant to master blacksmith, two trumpeters, two harness-makers and seventy cannoneers; or a total strength of 108. Every company, troop and battery has in its ranks, a tailor and shoemaker.

The following is a tabular statement of the strength of artillery units, on a peace footing:

|                               | Officers. | Men.  |
|-------------------------------|-----------|-------|
| Fortress artillery battery    | 4         | 129   |
| Fortress artillery battalion  | 29        | 790   |
| Light artillery battery       | 5         | 103   |
| Horse artillery battery       | 5         | 105   |
| Divisional artillery regiment | 77        | 1,274 |
| Corps artillery regiment      | 77        | 1,280 |
| Mountain battery              | 4         | 156   |

## ON A WAR FOOTING.

|                               | Officers. | Men. | Horses. | Guns.       | Wagons. |
|-------------------------------|-----------|------|---------|-------------|---------|
| Light battery                 | 4         | 173  | 155     | 6           | 18      |
| Horse battery                 | 4         | 181  | 215     | 6           | 18      |
| Infantry ammunition section   | 3         | 110  | 149     | —           | 38      |
| Artillery ammunition section  | 3         | 102  | 174     | 6           | 25      |
|                               |           |      |         | spare guns. |         |
| Corps art'y park (4 sections) | 17        | 644  | 960     | —           | 197     |
| Corps ponton train            | 8         | 250  | 970     | 21          | 45      |
|                               |           |      |         | pontons.    |         |

All officers, *adjudants*, sergeants, and the men of horse batteries, are armed with revolvers. The gun detachments of light batteries, non-commissioned officers and privates of fortress artillery, are armed with a short rifle. For mounted duty the sword is always attached to the saddle.

#### THE FRENCH FRONTIER.

France, through the war of 1870-71, lost her naturally strong line of frontier and was compelled to erect an artificial one in its stead, at an expense only possible to a nation of immense wealth and generous self-sacrifice.

The eastern frontier is 170 miles long, and is defended by two principal lines, between which are central works. The first extends from Montmedy-Longroy to Lomont, and consists of strong positions connected with each other by independent detached forts. Between these points there are two gaps left undefended, the one between Montmedy and Verdun, and the other between Toul and Epinal. The second line extends from the small town of La Fère to Besançon-Dijon and forms a barrier to an enemy that may have crossed the first line. Paris forms the central point of this grand frontier defensive system.

*First line of defense.*—At the northern extremity or left flank of the 1st line are the second-class forts, Montmedy and Longroy, which would block the R. R. from Luxemburg, between Thionville and Sedan. Between Montmedy and Verdun lies an open space 19 miles long, through which runs the northern causeway from Alsace-Lorraine to Paris. The upper course of the Meuse, near Damvillers (east of Dun) presents the first real obstruction to the invader, but a stronger defensive position is furnished by the Argonian Heights further west between Aire and Aisne, which are well known to have played an important part at the beginning of the French Revolution.

In 1880 there was not even a battalion here to oppose the invading Germans. The right wing of the Argonian line is secured against irruptions from the south by the Meuse Highlands. Verdun, with a population of 18,000, has assumed much importance by the treaty of Versailles and has become the centre of many R. R. lines; besides, through it runs the most direct and the most advantageous strategic invading highway, while from the nature of the country north of it, the position cannot be turned. It therefore forms a powerful base of operations in the valley of the Meuse.

The fortification of this place, after 1870, became one of the first cares of the government, with the object of making it the base of defensive and offensive operations against Metz. The intrenched camp of Verdun consists of 17 forts with numerous smaller works and permanent batteries, which are grouped in two lines and occupy a circumference of 19 miles. The old fort and citadel constitute the centre and would, in case the rest were taken, be still an independent work. The distance of these works from each other varies from 80 yards to 3 miles, and from the city, 3 to 5 miles. The citadel, forts and batteries, are united with a system of narrow-gauge railroad, which facilitates greatly the transportation of supplies. The garrison is about 35,000 men.

The plans of frontier defense prepared by General Seré de Rivi re proposed to give the open frontier the essential qualities of a good naturally defended border, viz. :—to render it for the greater part impassable, and to reduce the possible mode of approach of the enemy to accurately determined lines.

The first barrier of this kind was formed between Verdun and Toul, whereby a distance of 62 miles, by obstructions and full utilization of the terrain, is protected at least against sudden invasion. For this object, there are placed 7 independent detached forts, partly on the east and partly on the west border of the chain of hills—“*C tes de la Meuse*,” which are well defended and connected by flying columns of troops, numbering about 6000 men.

The intrenched camp of Toul forms the right wing of this barrier. This town of 8000 people was a small fort in 1870, and intended for closing the only R. R. line between Germany and France. Like Verdun, after the exit of the German troops it became the centre of many lines of communication and grew to considerable importance. The fortifications around Toul consist of 21 forts, with lesser works and batteries, 14 of which are distributed along the outer line, which is 30 miles in circumference and 7 on the inner line. It takes 25,000 men to garrison Toul, of which force 12,000 are always kept in readiness to move as a flying column, in connection with the forts, or in any direction. It is expected that their demonstration in rear of an enemy attacking the two detached forts of the “*Meuse barrier*,” lying north of Toul, would make itself felt.

The la Haye tableland lying east of Toul, covered with thick

woods, forms a strong obstacle to the approach of the fortress and forms an important base for offensive operations through the valley of the Meuse. The importance of this plateau is such that two detached forts were built for its defense—Frouard and Pont St. Vincent. There is no fort on the east slope of the plateau, for it has an excellent natural defensive position even against overwhelming numbers. The open town of Nancy lies near the middle point of this position, but it was determined not to fortify it, on account of the large force that would be required by so greatly extended a line of that of Nancy-Frouard-Pont St. Vincent.

Between Toul and Epinal, which are 44 miles apart, is the second gap, of 30 miles in extent, defended only by the course of the Moselle. On the important route leading from Alsace to that stream, between Abricourt and Luneville (which is 8 miles east of the latter town and 6 from the frontier), lies the large detached fort of Manonvillers, the object of which is to command the R. R. between Strasburg and Paris in the space between the political and military frontier and to defend the exit of the Vosges line from Luneville to Saint-Die. Through this gap between Fort Pont St. Vincent, and Fort Dogneville of the intrenched camp of Epinal, it is expected the enemy will invade France, or it will form the exit for a French offensive army against Strasburg.

Epinal has a population of 16,000, and its position as the centre of many railroads, as well as its many other strategic advantages, make it the manœuvring pivot for a large army. In connection with Belfort, Montbéliard, and the intervening works, it forms the second barrier of the frontier line of defense. This fortress has recently become one of the first-class, and consists of 24 forts in a circumference of 27 miles, connected with intervening works and batteries, the distance of the forts from the town varying from 6 to 2 miles and their distance from each other from 500 to 4000 yards. They are connected by a network of tramways similar to those of Toul and Verdun.

Belfort, the next intrenched camp, lies southeast of the former, and is 42 miles distant from it. The Vosges mountains occupy this interval and present few opportunities of invasion. Yet the few routes by which an army from upper Alsace could penetrate are of great strategic importance and are defended by five forts, located not in the passes themselves, but on the line of

the Moselle, the most northern being 4 miles from the southern fort of Epinal.

The defense of the Burgundian passageway or gate is the special mission of the celebrated fortress of Belfort, which played such a distinguished part in the war of 1870-71. It also forms a base for offensive operations eastward. The place consists of 15 forts and permanent batteries in a belt of 25 miles; 4 detached works provided with steel turrets, two north and two south of this girdle and 6 miles distant therefrom, with 8 forts and lesser works forming a second line. There are several out-works connected with this network of forts, intended to check any attack by regular approaches. All are connected by rapid transit like the other first-class fortresses. The space between the detached fort of Giromagny and the next girdle fort can be defended by a line of field-works and a movable battalion, so that the surrounding of Belfort on the north would be absolutely impossible. The fortified positions of Montbéliard and Lomont serve as a further protection to Belfort on the south and a support to the forts of the first line against the Swiss frontier. The first consists of the castle and batteries of the same name, and the second of two powerful forts—La Chaux and Mont-Bart—the more northern of which is 4 miles from the most southern work of Belfort, and the other about the same distance from its companion. Fort Lomont is one and a quarter miles from the Swiss frontier, and commands, with its group of batteries, the two highways of invasion along that frontier.

The complete defense of the interval of 62 miles between Epinal and the Swiss frontier is the task of the army concentrated on the upper Meuse and Moselle, and in front of the only open roads of egress from or toward Germany.

*Second Line of Defense.*—The second line of defense on the French frontier comprises two groups of works widely separated. The first,—the most northward,—consists of the fortified position of La Fère-Laon and Reims; the second comprises the intrenched camps of Langres, Dijon and Besançon, the last forming the extremity of the right wings of the 1st and 2d lines. The position of La Fère answers for two purposes—1st, as a bulwark against a German invading army through Belgium, and 2d, against an enemy directly from Alsace-Lorraine, who had broken through the first line of defense. A body of troops moving on Paris would have its right flank and lines of communication constantly

threatened from Laon. The town of La Fère, of 5000 souls, on account of its important strategic position becomes the base of operations against an enemy pressing towards Paris through the valley of the Oise. Its position is defended by 3 forts and a group of batteries.

Laon, with 12,000 inhabitants, is situated on the top of a triangular hill, whose sides fall almost perpendicularly. The position commands the roads and railroads from Paris to Belgium through the valley of the Oise and forms the strategic key of the entire section between the valley of the Aisne and the northern frontier. Its fortifications consist of the citadel and two large casemate batteries at the angles of the hill; and two forts and a battery lying from 3 to 5 miles south and southeast of the town. The large detached fort of Condé-sur-Aisne, and annex batteries of the same name, are situated in the interval between Laon and Reims—a distance of 28 miles.

The fortified region between La Fère, Laon and Condé-sur-Aisne forms a carefully prepared battle-field in which a French army forced to retreat, can halt with safety and confront an enemy of much superior strength. Southward from Laon lies the position of Reims, on the Vesle, of 81,000 inhabitants and fortified since 1874. This city forms an important strategic centre against all lines from the north towards Paris, for by it must pass, through the defile of Epernay, the roads, canal and R. R. from Strasburg to the capital. The intrenched camp is for the most part located on the heights that surround the city, thereby cutting it off from the frontier lines of communication. The place consists of ten forts and batteries in one line, on the prolongation of which three forts have recently been erected. There are two independent detached forts between Reims and Epernay.

The fortified position of Reims, as at present constituted, offers an excellent point for concentration against an enemy marching through the valley of the Meuse and the Argonian chain from Metz, for he must pass by this position before he continues his march to Paris. An enemy passing through the interval between Toul and Epinal, would soon reach the plateau of Langres which commands the basins of the Seine and Saône, and later be on the direct road from Basle to Paris. To prevent this, the plateau is strongly fortified, and the intrenched camp consists of a network of 14 forts with intervening batteries and a citadel, in double lines connected by railroads. The chain of outer works is 32 miles in



length, and they are distant from the city from 2 to 10 miles, and from one another from  $1\frac{1}{2}$  to 6 miles.

In consequence of these long distances the Camp of Langres requires a large garrison for its defense. But the true object of this camp is to serve as a base of operations for large armies, and especially for that of an army of reserve operating in the rear of an enemy. This object would be still better fulfilled within the triangle included between Langres-Besançon-Dijon.

Besançon, a place of 54,000 people, on the river Doubs, 53 miles from Langres and 47 from Dijon and Belfort, forms the key to the plains of the upper Saône and the plateau of Sequanaïs. Four lines of railways and several roads come together here. The natural features of the terrain in the vicinity of the city render it difficult of access. Around the city there is a double line of forts, the inner consisting of only 8 works, while the exterior line has an extent of 26 miles and embraces 21 forts and batteries which are from 2 to 6 miles distant from the city and from one another. These were built shortly after the war of 1870 and the following additions have been built since, viz. :—17 forts and batteries distributed in a circumference of 30 miles and averaging 6 miles apart. It takes a large force to garrison this fortress, in connection with its outer works, but then it would require an army to besiege it. Besançon is considered one of the most strongly fortified places in Europe and one of the most difficult to be captured. It may be said of both Besançon and Langres that neither lies on an important point of communications, nor do they defend any of the great lines of invasion.

General Werder, after the fall of Strasburg in 1870, paid no attention to Besançon but turned directly towards Dijon. At this strategic point the best roads between the basin of the Rhône and Seine meet and open up the way to the Moran Highlands, which serve as a natural fortress between the two upper basins and that of the Loire. From Dijon an advance can be made in the direction of Langres or Besançon, or in the opposite direction towards Paris, by the Seine basin, or to Autun, Nevers, and the middle valley of the Loire. The great distance between the forts necessitates not only the erection of numerous field-works but even placing the surrounding villages in a condition of defense, so that the garrison may hold the position.

Dijon is considered a better point for the concentration of a retreating army pursued by a victorious enemy. The five great

intrenched camps of Epinal, Belfort, Langres, Besançon and Dijon, give to the whole southeastern theatre of war the appearance of one vast camp, with the strongly fortified and garrisoned city of Lyon, properly facing Italy, for a background.

Thus the French eastern frontier line of defense is the most powerful line of fortifications ever constructed. From Verdun to Belfort is an unbroken flawless line of steel, with the exception of the two gaps already referred to; not a foot along the line is beyond the reach of heavy artillery. The number of large guns mounted on the forts varies between 20 and 50; some as high as 80, and many are strengthened with armored towers. All the forts are supplied with signal material and electric lights; telegraph, telephone and pigeon stations, and the most improved devices have been adopted to render these impregnable against siege approaches and impossible of surprise.

Finally, the gigantic intrenched camp of Paris lies in rear of this magnificent line of frontier fortifications, and as it is not strictly a part of it, I will not give a description of its forts but will say in passing, that it requires 150,000 men fully to garrison Paris and its environment (30,000 of whom would be for garrison duty, and the balance for moveable columns of defense) and 1400 guns in reserve and actually mounted completely to equip it.

Opposed to this line of frontier defense Germany has the strong fortresses of Metz and Strasburg on the Alsatian border, and the Mayence-Strasburg line of fortifications on the Rhine, which latter is being extended to Basle with a view of covering the numerous railroad bridges across the Rhine which were built expressly for the rapid transit of troops from the south into upper Alsace.

Mayence, which is tremendously powerful, has recently been transformed into an intrenched camp and now forms the principal basis of supplies for the German armies on the left of the Rhine.

The nations of Europe cannot much longer bear the enormous cost of their standing armies. In 1893 Europe expended one billion of dollars for its armies, and still asks for more. Commerce has not developed, on the contrary it has decreased. Europe, therefore, cannot support additional burdens. But the great powers are afraid to disarm, and the little ones must follow the example of their masters; hence both great and small are kept on the verge of financial ruin and consequent national suicide.

There are two solutions to the problem—disarmament or war.

The one is impossible because every one is afraid to take the initiative ; the alternative then will be war, which will take place when one of the greater powers having arrived at the end of its resources finds the opportunity.

Europe, to-day, is one vast powder magazine, that may be fired at any moment by a chance spark, which may come from any direction or cause. The portents at present seem to indicate peace, but when the explosion does come, the sun will shine on the clash of millions of men, thoroughly disciplined and possessing the means of scientific slaughter, the killing power of which increases day by day.

The victor will be the side that gains the first two or three pitched battles, which will be won by armies of two or three hundred thousand men, but not of millions. Victory will be decided, as of old, by the best generalship. Germany, for tactical and strategic reasons, will at once assume the offensive, and to be victorious must successfully meet the obstacles presented in the following words of Chancellor Caprivi—"On crossing the frontier we should find, not, as in 1870, eight French army corps opposed to our seventeen, but forces numerically equal, if not superior, splendidly organized and equipped, with enormous reserves behind them. Allowing that we defeated them, we come upon a series of formidable fortresses on the Moselle and Meuse, each stronger than Strasburg and Metz in 1870. We pass them by and we arrive before Paris—not the Paris of 1870, but a fortified city such as the world has never seen the like of, with thirty-six forts and an outer line of defenses sixty miles in extent." The result of the colossal struggle herein indicated it is impossible to predict,—the near future will probably tell.

## THE MANAGEMENT OF A POST HOSPITAL.

BY MAJOR JOHN VAN R. HOFF, SURGEON U. S. ARMY.

IT has been said that "at the outbreak of the Civil War this country knew nothing practically of large military hospitals; indeed most of the volunteer medical officers knew nothing of military hospitals small or large." How well they learned their lesson is written in history, and all the world was astonished at the magnitude of their achievements.

On December 17, 1864, the capacity of the military general hospitals of the United States was 118,057 beds, of which number 83,400 were occupied.

The medical records of that war account for 6,454,834 cases of which number 93,969 died from wounds and 210,400 from disease.

The medical department disbursed between the years 1861 and 1866, \$47,351,982.24.

The foregoing is cited to show how vast an institution the post hospital may become, for as truly as is the company the prototype of the regiment, and the regiment of the brigade, so is the post hospital the prototype of the great general hospital, with its thousands of patients and hundreds of personnel.

For convenience of administration a hospital may be divided into departments, and if necessary the departments may be subdivided into sections or divisions, depending upon the special requirements of any particular hospital.

Ordinarily in the standard military post hospital the departments consist of:

1. The store rooms and laundry.
2. The dispensary, operating room and library [medical officer's office].
3. The wards [two main wards, one isolation ward, and one officer's ward].
4. The mess-room and kitchen.
5. The squad rooms.
6. The basement and outside dependencies.

Each one of these departments is under the immediate charge

of a non-commissioned officer, or specifically assigned private soldier, who is made responsible for the proper conduct of his department, and who may have one or more men serving under him for whom he is also responsible.

The commissioned personnel of the post medical department usually consists of two medical officers, the senior of whom commands it, and who within his department has the same weight of authority and command as attaches to any other organization commander; he is responsible for the condition and management of the hospital, for the care and treatment of the sick, for the instruction and discipline of his detachment of the hospital corps; he is accountable for all the public property pertaining to his department, for the proper expenditure of medicines, for the keeping of all records, and for the making of all reports and returns, etc.; he is the sanitary officer of the post and through frequent inspections thereof keeps the commanding officer, whose staff officer he is, informed of its sanitary condition.

His duties lie chiefly with the military personnel of the command.

The duties of the junior medical officer are to a considerable extent determined by the special conditions obtaining at any post. He is to the senior medical officer what a lieutenant is to his captain and does what he is directed to do. He usually attends the sick reporting at surgeon's call, though it would seem that this single daily formal official contact between the medical department and the rest of the command should generally be made through the senior medical officer. It has been said that one of the best indices of the discipline of a command is found in the manner in which the sick are reported at surgeon's call. The hour and conditions seem to tempt to laxity.

The junior medical officer assists in the instruction of the men of the hospital corps detachment, he examines recruits, he renders professional assistance to the civilians attached to the command, he does whatever he may be directed to do, and aids in every way possible to maintain the efficiency of his department.

#### AT A POST OF TEN COMPANIES, OR EQUIVALENT STRENGTH.

The detachment of the hospital corps usually consists of two non-commissioned officers and eight privates, whose duties are outlined as follows:

The hospital steward as senior non-commissioned officer of

the hospital and detachment is responsible for the proper conduct of the hospital in every department, and for the discipline and instruction of the detachment; he is especially charged with the supervision of the wards and kitchen, the care of the store rooms and stores therein and of the laundry, the keeping of the records, and making of reports and returns, the correspondence, etc.

The acting hospital steward is the junior non-commissioned officer of the hospital and detachment; he is in charge of the dispensary, operating room, and library, and his responsibility lies in the dispensing of prescriptions, the care of instruments, dressings and surgical appliances, etc., the preparation of the operating room for operations, etc., he also assists the medical officer in examining recruits, and the senior non-commissioned officer in preparing reports, etc.

Two men are assigned to duty in the wards. Usually the average demands made upon the hospital do not exceed the capacity of one ward and it has been found advantageous to alternate the wards monthly. This plan permits of the thorough cleaning, disinfecting, and airing of the vacated ward, in a way not possible during its occupancy.

The duties of the nurse pertain directly to the care of the patients, and are summarized in the special regulations governing this office, he should be impressed with the great responsibility of his position, and held to the strictest accountability. No man is fit to be a sanitary soldier upon whom individually oftentimes the greatest responsibilities will fall unless he has the highest appreciation of his office, and a loyal devotion to the duties thereof. The nurse ordinarily will attend all drills, instruction, and inspections, being for this purpose relieved by a non-commissioned officer if necessary.

The duties of the attendant in charge of the unoccupied wards, after they have been thoroughly cleaned and put in order, are largely determined by circumstances. Should it be required he assists and relieves the nurse; he has charge of the officer's ward and the isolation ward, and should they be occupied, he becomes the nurse therein. Being in charge of the property contained in the unoccupied wards, ordinarily he would not be detailed upon duty which would make it impracticable for him to look after the property in his department, but generally he will be found to have ample time to assist in the police of the administration building, and to act as orderly for the medical officer on duty at surgeon's

call ; when in due time his ward is re-occupied he becomes the nurse, which office for the time is relinquished by the attendant in charge of the recently occupied ward, who assumes in turn the duties of that position. He attends all drills, instruction, and inspections.

The cook occupies one of the most important offices in the hospital and should be imbued with a lively sense of the responsibility of his position. The general rule obtaining in all departments that everything must be absolutely clean, is in this department emphasized ; for no door opens wider for the admission of disease than the door to the stomach, and over this the cook stands guard.

The manipulation of the ration to obtain the best results in the way of variety of food, to see that no waste occurs, to increase the savings by every legitimate means, are all important duties outside the equally important work of preparing, cooking, and serving the food. He teaches his assistant how to prepare and cook food, how to manage the ration, etc. He draws the rations from the commissary, and keeps the material under lock and key. He each day submits a bill of fare for the succeeding day to the senior non-commissioned officer, which will as nearly as practicable conform to that specified in the diet table from the Surgeon-General's Office, and which when approved will be observed. He keeps his range and cooking appliances always in working order, and at once reports anything likely to interfere with the efficiency of his department.

Owing to the extent of his duties the cook is ordinarily required to attend only one drill each week, and all inspections.

The assistant cook is, under the cook, in charge of the mess-room and beside his duties in the kitchen, he sets and waits on the tables, washes the dishes, polices the tables and room, cares for the refrigerator, draws the bread, meat, etc., looks after the fire and lamps, prepares the drinking water, and does such other work as may be required of him. He attends all drills, instruction, and inspections.

Ordinarily the attendant on duty in the administration building whose chief occupation is the police of that part of the hospital, also acts as room orderly, he is in effect the immediate assistant of the non-commissioned officers, and is under instruction in the dispensary, certain of his duties may if necessary be



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Ordinarily the attendant on duty in the administration building whose chief occupation is the police of that part of the hospital, also acts as room orderly, he is in effect the immediate assistant of the non-commissioned officers, and is under instruction in the dispensary, certain of his duties may if necessary be

shared by other less occupied men, as the attendant in the unoccupied ward, or a private not otherwise assigned, etc.

The duties of the ambulance driver are quite extensive, and oftentimes will have to be shared by another private of the detachment; he should be what is familiarly called a "handy" man, capable of doing the thousand and one little things, a nail here or a pane of glass there, constantly required about a building, and which the quartermaster cannot always have attended to at once. A box of carpenter's tools, and a man with some knowledge of their use is almost invaluable in a hospital corps detachment. Usually the ambulance driver will be in charge of the basement and grounds, the hospital garden in summer, and the furnaces in winter, and of the dead house; he also takes charge of the cow and cow-shed. He attends all drills, recitations, and inspections.

The foregoing scheme leaves two men of the detachment unassigned, which provides for the contingencies of sickness, furloughs, detached service, etc., and permits of special assignment in any department where additional assistance may be required.

The management of the hospital is generally facilitated by a code of regulations, for while regulations cannot be made to cover every point they certainly give decided indications of what is required. Those who have no written regulations and are thereby constantly forced to repeat, to them, threadbare instructions, will hardly sympathize with the officer who said he never made any rules, for then he was sure they would not be disobeyed.

It is but fair to the men that they should know what is expected of them, and it is far easier for the officer to teach them by the book, than by tradition, for oftentimes tradition gets badly mixed.

No particular originality is claimed for the rules which follow; they are compiled from various well-known sources, and evolved from an experience common to every medical officer; doubtless much of value could be added to them and some things might be omitted. These regulations naturally divide themselves into general for the hospital and detachment H. C., and special for the different departments.

#### REGULATIONS FOR THE GOVERNMENT OF THE U. S. POST HOSPITAL.

1. Patients will give prompt obedience to the hospital stew-

ard, nurses, etc., in all lawful commands. Any infractions of discipline, disobedience of orders, drunkenness, or disorderly conduct will be promptly punished.

2. During the official [morning and evening] visits of the medical officer every patient must be in his ward. Patients who are able, will rise when the medical officer enters the ward, and will remain standing at the foot of their beds until prescribed for or otherwise ordered. Other patients will cease all occupation.

3. No patients will be allowed to enter the library, dispensary, mess-room, kitchen, or other rooms of the hospital unless on business. Lounging about the halls is forbidden.

4. On reception of a patient his effects will at once be turned over to the nurse, who will examine them, and enter them [each article separately] in the register of patients' effects, and cause them to be neatly packed and placed upon a shelf in a numbered compartment of the clothes press. All money, watches and other valuables, after being entered as above are to be turned over to the hospital steward, who will enclose them in an envelope marked with the patient's name and deposit them in the safe. When the patient leaves the hospital his effects will be returned to him, and he will receipt for them in the register of patients' effects.

5. Each patient will be given a bath upon entering the hospital unless his condition forbids it; if able he will wash his face and hands and comb his hair at least every morning, and he will be required to keep himself clean both as to person and clothing. Those who are unable to do this will have it done for them by the nurse.

6. Patients will be required to wear hospital underclothing while occupying beds in the hospital, and hospital gowns when permitted to sit up in the wards. No patient will occupy his bed without undressing.

7. The beds will be made every morning and always kept clean and in order. The sheets will be changed at least once weekly and each time a bed is vacated. The counterpane will be removed when a bed is occupied, and a sheet placed over the blankets to protect them. The mattress will ordinarily be turned over before the bed is made. The blankets and bedding must be frequently aired. Mattress covers will be changed once each month, or oftener if necessary.

8. No food, spirituous liquors, or articles of any kind whatso-

ever shall be brought within the hospital without permission from proper authority. And no patients will be allowed to receive such food, liquor, or other things without permission from a medical officer.

9. Profane or vulgar language, loud talking, whistling or singing, is forbidden in this hospital.

10. Smoking is not permitted in the wards or passageways of the hospital, or on the main floor of the administration building, or in the kitchen or mess-room.

11. Convalescents are required to perform such light work about the hospital as they may be able to do.

12. Talking in the wards must cease at 8.30 P. M., when all the patients will go to bed. All lights in the wards will be lowered at 9.00 P. M., and at 11.00 P. M., all other lights in the hospital except the specially designated night lights will be extinguished.

13. No patient will be allowed to leave the hospital without permission from proper authority.

14. Except in case of emergency, medicines or other property pertaining to the medical department will be issued only upon the order of a medical officer.

#### REGULATIONS FOR THE GOVERNMENT OF THE DETACHMENT OF THE HOSPITAL CORPS, U. S. POST HOSPITAL.

1. All men on duty in the kitchen and mess-room will arise one hour before reveille, all other members of the detachment (unless specially excused) will arise at reveille. Immediately after dressing each man (except those on ward duty who sleep in the wards and whose beds are always made down) will neatly fold his bedding, each article separately, and pile it at the head of his bunk, beneath the pillow. Beds will not be made down before 8.30 P. M. except in case of sickness or other necessity. All clean under clothing will be neatly folded and placed in the lockers, all outer clothing will be brushed and hung in the closets, dirty clothes will be kept in the barrack bags. Shoes will be polished and placed on the floor of the closets, or at the foot of the bunks.

2. Immediately after breakfast the hospital will be thoroughly policed in every department, it must be ready for inspection at 9.30 A. M. and always be kept absolutely clean. No water will be used on the floors without special permission from the senior non-commissioned officer.

3. The men will pay the utmost attention to personal cleanliness, each will bathe at least once weekly, his hair must be kept short and his face shaved, or beard neatly trimmed.

4. Breakfast will be served a half hour after reveille, dinner at 12 M., and supper at 5.30 P. M. All men will repair promptly to the mess-room at the appointed time in proper dress, no one will be permitted at the table in shirt sleeves.

5. Members of the detachment will wear the prescribed uniform at all times when present at the post; while on fatigue they may wear the fatigue dress; while on duty in wards, dispensary, operating room, or kitchen they may wear the white duck blouse.

6. The name of each soldier will be attached to his bunk, and his detachment number will be placed upon his accoutrements, which latter, together with his knife, will be hung by the belts on a hook in his closet.

7. All bunks will be overhauled each week, and the bedding and mattresses together with the clothing will be well shaken and hung out to air for at least two hours. Mattress covers will be changed immediately before each monthly inspection, or oftener if necessary. Sheets and pillow cases will be changed at least once each week.

8. All public property in the possession of the men must be kept in good order, and all missing or damaged articles must be accounted for.

9. Members of the detachment will not at any time leave the hospital except by permission from proper authority, or in case of emergency in the execution of duty.

10. The senior non-commissioned officer will keep an accurate account of all public property pertaining to the medical department, and its place of distribution. Each man in charge of a department of the hospital, as nurse, cook, etc., is responsible for the public property used in his department, he will receipt for the same and by frequent inventories assure himself of its presence.

11. The supervision of cooking and messing is of the utmost importance. The kitchen is placed under the immediate charge of the senior non-commissioned officer, who is held responsible for its condition and the proper use of the rations. The greatest care will be observed in cleansing cooking utensils, crockery, etc. No one is allowed to visit, or remain in the kitchen except those who go there on duty, or are employed therein.

12. The diet table of the Surgeon-General's Office, and the manual for army cooks, contain instructions in the art of cooking, which will be observed as far as practicable.

13. All lamps in use must be cleaned filled and made ready for lighting before the morning inspection. The filling of lamps after dark is absolutely prohibited.

14. All men on duty with this detachment must treat patients with gentleness and consideration. They will at once report any breach of discipline on the part of a patient.

15. Each non-commissioned officer and man will assist the other men of the detachment in learning everything pertaining to their duties as sanitary soldiers.

16. All non-commissioned officers and privates of the detachment will be present at all formations, unless specially excused. Ordinarily but one non-commissioned officer will be required to attend recitations.

17. Each non-commissioned officer or man upon his assignment to a department of the hospital will make himself familiar with the special orders governing it.

18. No information regarding the condition or diseases of patients under treatment will be given to any one except those authorized under the regulations to receive it.

19. Upon the sounding of an alarm of fire or the "assembly" all men of the detachment not engaged in subduing fire, rescuing patients, or property, etc., will *instantly* assemble at the foot of the main stairway.

20. The senior non-commissioned officer will see that all men of the detachment and all patients in hospital are always present or accounted for.

21. Officers and non-commissioned officers are required to see that all orders and regulations are complied with.

SPECIAL REGULATIONS FOR SENIOR NON-COM. OFFICER, U. S.  
POST HOSPITAL.

The senior non-commissioned officer is, under the medical officer commanding, responsible for the order and discipline of the patients and detachment of the hospital corps, and the police of the buildings and grounds, he supervises the work of the entire hospital establishment, and in the performance of his duty must exercise patience, gentleness and at the same time firmness in dealing with those under him.



He is responsible for all public property pertaining to the medical department, and will keep an accurate account of it, and of its place of distribution and condition.

He accompanies the medical officer in his official rounds and carefully notes his instructions and orders and sees that they are executed. He transmits to the cook the diet orders, and enters the same on the nurse's list of instructions.

He makes out or supervises the making out of all reports, returns, requisitions, etc., and keeps or supervises the keeping of all books, records, and correspondence pertaining to the hospital.

When any case of illness or accident is reported at or brought to the hospital, he immediately causes a medical officer to be informed, and pending his arrival takes such steps as may appear to him to be necessary to meet the requirements of the case.

When a patient is admitted to hospital or quarters he sees that his name is duly entered in the blotter, and that all cases excused from duty, discharged, transferred, or dead, are entered in the register of sick.

He inspects the wards, mess-room and kitchen, at the appointed hours for meals and sees that the prescribed diets are served in a proper manner.

When a death occurs he reports it to the medical officer at once. When men are to be discharged from hospital at the hour of surgeon's call he will cause them to report to the medical officer in charge of that duty before they are turned over to the sick marchers.

He will accompany through the hospital any officer authorized to visit it.

He will not leave the hospital without formally placing the next senior non-commissioned officer, or a selected private present in charge of his duties.

He will cause all keys to be labelled, and such as are not in constant use to be hung on a key-board in the dispensary.

He is responsible that the fire apparatus is in readiness for instant use at all times. In case of fire and at all other times when the presence of the detachment is immediately necessary he will cause the "assembly" to be sounded, when all men of the detachment will *instantly* rendezvous at the foot of the main stairway.

He visits every part of the hospital after breakfast, and after the patients have retired, and ascertains that everything is correct.

He does not permit any floors to be scrubbed except under special instructions. He sees that all floors are swept and polished daily.

He superintends the mess, keeps an accurate account of all receipts and expenditures, causes the bill of fare for each day to be entered in a book kept for that purpose, and himself records the condition of each meal.

SPECIAL REGULATIONS FOR JUNIOR NON-COM. OFFICER.

By virtue of his rank he assumes the duties of the senior non-commissioned officer in the latter's absence.

He is responsible for the care of the dispensary, library and operating room, their contents, and for all medical stores, surgical instruments and other appliances entrusted to his custody.

He is responsible for the methodical arrangement of all drugs, etc., in the dispensary, and for their economical use, the safe and proper keeping of alkaloids and other poisons under lock and key, and the regularity and punctuality of all details in the issue of medicines.

He is responsible that each bottle or packet is carefully labelled with the name of the patient, the nature of the medicine, and the directions for use.

He will himself dispense, or supervise the dispensing of all prescriptions. If at any time he is in doubt about a prescription he will before dispensing it refer to a medical officer for instructions. He will dispense no medicines without a prescription and will file all prescriptions for inspection.

He assists in the preparation of all reports, records, and correspondence.

He is responsible that the stomach pump, hypodermic syringe, and all other surgical instruments and appliances are in readiness for instant use.

He assists in the examination of recruits.

He charges all bottles issued against those receiving them, and sees that they are returned or accounted for.

SPECIAL REGULATIONS FOR ATTENDANT ON DUTY IN  
ADMINISTRATION BUILDING.

He assists in the compounding of prescriptions, in the care of surgical instruments, and appliances, in the keeping of records, and preparation of reports and returns.

He is responsible for the police of the entire administration

building in which he is assisted when necessary by the attendant on duty in the unoccupied ward, or another duly assigned private.

He assists in preparing the operating room for operations, and assists at the operation. He cleans and rearranges the operating room, and assists in cleaning the surgical materials and in putting them away in their proper places, he replaces the dressings and sees that everything is in perfect order, and condition. He is room orderly, and is responsible for the condition of the squad room.

He does such other work as may be required of him.

#### SPECIAL REGULATIONS FOR NURSES.

The nurse is responsible for the care, cleanliness, and nursing of the sick.

He sees that every patient is in his proper place previous to the official rounds, accompanies the medical officer during his visits to the ward, and carefully notes his instructions and orders. He prepares the patients for such examination as the medical officer may desire to make, and sees that instruments likely to be required for examinations, towels, and water are at hand.

He receives from the steward the remedies ordered for the patients and is responsible for their correct distribution in accordance with the orders of the medical officer.

He personally superintends the administration at the proper intervals of the remedies ordered, and the application of minor dressings, and is responsible that the patient is properly cared for in every respect.

Medicines must never be administered without first carefully reading the label, and if liquid, as a rule should be shaken before being poured out.

He serves the prescribed diets at the appointed hours and permits no food or plates used for such to remain in the ward after the patient has finished.

He sees that each patient has a clean shirt and socks twice weekly, or oftener if necessary, that if permitted up he wears a gown; that the bed sheets are changed at least once a week, and when the bed is vacated; and that the mattress covers are changed at least once a month.

He sees that every patient is in bed by 9.00 P. M. and that all lights are lowered at, and no conversation permitted after, that hour.

He takes over all public property in his department, receipts for it, and is responsible for it. He makes a careful inventory of the property upon receiving it, and each week thereafter while it remains under his charge he counts it, and will immediately report any shortage thereof, or damage thereto.

He will allow no article of clothing or other thing in or about the beds.

He is responsible that the ward is properly cleaned, lighted, ventilated, and warmed.

He must be particularly cleanly in person, must preserve good order in his ward, be attentive to the wants of the sick, and punctual and exact in obeying orders.

He carefully observes the patients and keeps a written record of temperature, respiration, circulation, excretion, and all symptoms which will assist in determining conditions or treatment.

He will when a patient is seized with alarming symptoms at once report the same to the senior non-commissioned officer.

He is immediately in charge of the linen closet and is responsible for its contents. He collects the soiled linen pertaining to the ward and places it in the clothes hampers kept for that purpose. He receives the soiled linen from the various departments and immediately issues therefor a like number of clean articles. Under the supervision of the senior non-commissioned officer he makes a list of the soiled linen in the hospital wash book, and a duplicate list, which latter he sends with the "wash" to the matron. He receives the "wash" from the matron and under the supervision of the senior non-commissioned officer, he verifies it and distributes it in the linen closet.

He does such other work as may be required of him.

#### SPECIAL REGULATIONS FOR ATTENDANT IN CHARGE OF THE UNOCCUPIED WARD.

The attendant in charge of the unoccupied ward is responsible for the property therein; he will immediately upon its being vacated take out all the furniture of the ward and expose it to air and sunlight for several days, he will brush down the ceiling and walls of the ward, wash the paint and windows, and polish the floors. He will open the windows to freely air the ward, will wash all the bedsteads with sublimated solution, and will put on clean mattress covers, and bed clothing. He will thoroughly clean and disinfect all fixtures in the bath room, wash the paint,

polish the floor, and place everything in perfect order, and keep it so. He ordinarily assists the attendant in charge of the administration building and is required to perform any additional work to be done.

He is in charge of the officer's ward and isolation ward, and the property therein, and will attend them when occupied. He will relieve the nurse when occasion requires it.

#### SPECIAL REGULATIONS FOR COOK.

The cook makes a careful inventory of the property pertaining to his department when he receives it, and each week thereafter while it remains under his charge; he will immediately report any shortage thereof or damage thereto.

The kitchen must always be clean and tidy, everything being as far as possible in its place. The tables should be scrubbed with soap and water daily, the floor mopped and dry rubbed. The range must be kept clean and in good order. The day's work will not be considered finished until the cook has emptied, thoroughly cleaned, and carefully wiped every pot, saucepan, or other cooking vessel in his charge. Saucepans, stewpans, and other cooking vessels must not remain on the fire without a sufficient quantity of water or other liquid in them to prevent burning; copper vessels must not be used if the tinning is defective. Acid substances or anything likely to become such must not be permitted to remain in glazed vessels. In preparing diets, etc., the cook will be guided, as far as possible, by the diet table of the Surgeon-General's Office, and the manual for army cooks. Special diet orders will be strictly complied with.

Before drawing rations (1st, 10th, and 20th) the cook will receive from the senior non-commissioned officer a list of articles required, which articles he will see are correctly weighed out to him, and will return the checked list to the senior non-commissioned officer, as evidence that the articles have been duly received by him. Great care must be observed in sending hot meals to the ward, in order to which the plates must be *warmed*. The daily bill of fare will conform as nearly as practicable to that specified in the diet table from the Surgeon-General's Office.

The food for patients confined to bed will be served immediately before the appointed hours for meals.

The cook is responsible for the instruction of his assistant in cooking and will see that he performs his work properly. Ordinarily he attends all inspections—and one drill each week.

## SPECIAL REGULATIONS FOR ASSISTANT COOK.

The assistant cook works under the instructions and directions of the cook, and an important part of his duty is to make himself familiar with the management and cooking of the ration, and special diets. He has charge of the mess-room, and its police, the setting of the tables, the serving of the meals and special diets.

He sets the tables and waits on them, and sees that they are cleaned after the meals are finished, he washes the crockery and other table furniture and puts them away in their proper places.

He goes for the meat, bread, and other materials required by the cook, he assists in drawing the rations. He keeps the refrigerator scrupulously clean, and assists the cook in preparing the food, washing the cooking utensils, and policing the kitchen, closets, and vegetable cellar. He chops the kindling wood and brings it and the necessary coal to the kitchen. He cleans, fills and lights the lamps pertaining to the mess-room and kitchen. He prepares the drinking water, giving the utmost attention to its purity, and the cleanliness of the vessels containing it. He does such other work as he may be directed to do.

## SPECIAL REGULATIONS FOR AMBULANCE DRIVER.

He takes charge of ambulance, harness, and ambulance shed, of the basement, cellars and area of the hospital, of the carpenter shop, of the grounds, of the cow and cow-shed, of the garden, of the furnaces and water heater. He drives the ambulance when necessary, keeps it and the harness clean, in order and ready for immediate use, polices the ambulance shed, etc. He is responsible for all public property in the basement, outside of the locked store rooms, and in the ambulance and cow-sheds. He polices the basement and grounds, and takes charge of the dead-house. He keeps the carpenter's tools in order, and makes such ordinary repairs about the hospital as may be required.

He prepares the ambulance, hand litters, and dressings for bearer drill, and sees that they are put away upon the completion of the exercises. He feeds, grooms, and milks the cow, and polices the cow-shed. He is the hospital gardner, and responsible for the condition of the garden. He makes and keeps the fires in the furnaces and water-heater, and is responsible that the hospital is properly warmed and supplied with hot water. He does such other work as may be required of him.

With such an organization the post hospital of twenty-four

beds may be readily expanded into the general hospital of even twenty-four hundred beds if necessary. The change being simply in the increase of personnel. The senior medical officer of the post becomes the medical officer commanding, and the junior medical officer, the executive officer of the hospital. The store rooms and laundry become the supply department, under charge of the executive officer, who is assisted by non-commissioned officers assigned to charge of the different divisions, and such privates as may be required. The dispensary, library, and the operating room are the charge of the medical officer, or non-commissioned officer detailed as recorder, who is assisted by non-commissioned officers as division chiefs, and the necessary number of privates as dispensers, clerks, orderlies, etc. The forty wards fall to the care of twenty medical officers, each having charge of two wards. Each ward has an acting hospital steward as ward master, and five nurses.

The mess-room and kitchen become the subsistence department under charge of the commissary officer, who is assisted by non-commissioned officers detailed to the various divisions, in which the necessary cooks, bakers, waiters, orderlies, clerks, etc., are on duty. He also has charge of the gardens, cows, and everything pertaining to the subsistence of the hospital.

The squad rooms, basements, heating apparatus, grounds, stables, transportation, shops, repairs of buildings, etc., police, cemetery, etc., are under charge of the quartermaster, with a non-commissioned officer for each division, who is assisted by a sufficient number of privates and employés.

The guard of a general hospital is usually furnished from the line of the army. Its duties are essentially those of a post guard and its management is identical with that of any other military body. Its commander receives his orders from the medical officer commanding the general hospital.

Should this paper, which is a simple story of the daily routine of a post hospital in "these piping times of peace," serve to call attention to the advisability of a uniform method of administration, so that,—to use an ordnance phrase,—the parts will be interchangeable, and our men passing from detachment to detachment will fall into familiar places, its writing will have been justified. To-day the parts are not interchangeable.



## THE PROVOST MARSHAL.\*

BY CAPTAIN G. S. CARPENTER, 14TH U. S. INFANTRY.

THE provost sergeant is a familiar figure, both in garrison and camp. Familiar is his scavenger cart, with plodding mule and unwilling prisoners, on its ubiquitous round of police duties and domestic economies, which do so much to relieve the officer of the day and have such a good effect upon the sanitary reports of the surgeon. But who ever saw a provost marshal?

The few survivors of the war remember him as a vision. A shadowy idea of his duties lingers in the Article of War which enjoins upon him the safety of prisoners. To the most, he is but antiquated history. Yet, no considerable army in the field, or city in a state of siege, could be well ordered without him. There can therefore be no real oblivion for him. He is but passive in peace, to be surely vivified in war.

With the great armies and the vast theatres of war in our country, the provost marshal reached a preëminence of usefulness never before known. Possibly, the like opportunity may never occur again. Despair of great opportunities, however, will not excuse neglect of preparations for minor ones. Let us cast a net into the sea of history, and draw thence of this odd fish what catch we may of food for the future.

Military literature, in general, gives but a vague comprehension of the duties of the provost marshal. For much information as to the origin and early development of these, we are indebted to the scattered allusions found in "Clode's Military forces of the Crown"; and for all else, to what is open to ordinary research.

The provost marshal's high-sounding title smacks of antiquity. Its roots are found far back in ancestral customs. Provost, from the Latin "*Præpositus*,"—one who is placed above others. This survives yet to name the official heads of the great universities of Oxford and Cambridge. The Lords Provost of Scotland's cities correspond in place to the Lord Mayor of London.

\* Read before the Post Lyceum, Vancouver Barracks, Washington.

Marshal is the utterance of a Northern race. The first syllable is the old high German name for the horse, and the whole word came with the Teutonic invaders into England as a distinguishing title for the "Master of the horse." He it was, who, when first nobles and knights assembled for battle, rode through the forces and marshalled each in order, with respect for the precedence claimed, and, no doubt, with regard to the disposition of the enemy and the nature of the ground. From thence, it fell naturally to him to maintain discipline and punish offenders.

Thereby became established the Marshal's Court. Lord Coke, Chief Justice of England, early in the 17th century declared his belief that "the foundation of military justice was in the old Marshal's Court." The marshal's jurisdiction was limited to minor offenses against discipline, and most especially to apprehensions (in *flagrante delictu*) red-handed in the act. In such cases his power was absolute, for he was, constructively, the eye of the commander, who, being responsible for good order and discipline, could correct what came under his own eyes.

Before the days of standing armies, when all men were liable to arms, the civil law alone governed, which forbid peril to life or limb except at the hands of a jury of peers. The civil magistrates tried soldiers for military offenses. Many generations of Englishmen, at arms, jealously resisted the encroachment of arbitrary power upon the right of trial by jury. As late as 1640, this jealousy hampered commanders in the field. Lieut.-General Conway complained that the "lawyers and judges have given opinions that, in order to be lawfully acquit, he should ask a pardon from the king for executing a mutineer," and says "there are now here, in prison, two men for killing of men, and the Provost Marshal for letting them escape out of prison, although he took them again. I do not think it fit the lawyers should deliver any opinion, for, if the soldiers do know of it, they will decide it by their disobedience."

The marshal's court, with its limited jurisdiction, existed from time immemorial, as did some form of a more deliberative and enlarged court-martial.

From the laws and ordinances put forth by Charles I. we gather the following. "The Provost Marshal General was to see all judgments and commandments of the Lord General and Council of War put in execution. No provost marshal shall refuse to receive a prisoner committed to him, nor release him without

authority. None of the king's liege people shall council, receive, or convey away any soldiers that have run away from their colors, but shall be obliged to deliver such to the provost marshal as soon as they possibly may. Every soldier shall, and others being desired, assist the provost marshal and his officers in the apprehending of malefactors."

James I. in 1639, formulated the earliest definition of the duties of the Provost Marshal General, and his subordinates. The marshal's court was "to hear, judge, and determine any fact done by soldiers," with "no power to put to death till they had advertised the general that shall have authority for life or death of such troops as he shall command." In every market where troops were there was to be a "gibbet and a strappado," and in every such borough "a provost, with a prison for soldiers apart from any other." The concluding article contained a description of the provost's duties. "The provost must have a horse allowed him, and all the rest commanded to obey, aid, and assist him, or else the service will suffer, for he is but one man, and must correct many, and therefore, he cannot be beloved. And he must be riding from one garrison to another, to see that the soldiers do no outrage, and scatter about the country."

In 1642, further articles provided that all proceedings in the marshal's court were to be duly recorded, and even the wills and testamentary dispositions of soldiers were to be registered therein. Punishments of the lesser sort were "loss of pay and office, fine and imprisonment, burning the tongue with a hot iron, whipping, riding the wooden horse, bastinado by his officers, besides such other punishment, not extending to life and limb, as the court should award."

As a bit of historic interest, apart from our subject, it may be added that an article provided that, "if a regiment or corps failed in their duty (as retreating before they came to handy strokes) the officers and every tenth soldier should be punished with severity, and the other of the soldiers should be put to servile offices in the army, until by some brave exploit they purge themselves." The last article was what the soldiers call, in modern times, the "Devil's Article," a sweep-net for all crimes not elsewhere named.

From the Articles of War in force at the abdication of James II., 1689, it may be gathered that there was then a Provost Marshal General, whose office it was to execute the sentence of a

general court, on warrant issued. And likewise, a provost marshal with each regiment, to execute sentences of regimental courts; and all officers and soldiers were enjoined to aid them in their duties, under penalty in case of refusal. Their functions as a *summary court*, while not recognized in terms, were continued, on custom, it would seem. A Councillor of War, and Advocate of the Army, is recognized in these articles. Clode remarks, in his recent work on military law, "the marshal's court was never that of the Judge Advocate, but of the military chief or hierarch, against whose rules of discipline the officer or soldier had offended."

From the words of an order issued by Henry II. of France on the 22d of May, 1557, we learn that the provost marshal filled well-established but not always agreeable functions. In the French army, the king ordered "that no soldier, under any pretext whatsoever, should obtain money from a comrade by play, and if so, by foul play, for the first offense he should be publicly flogged, and for the second offense his ears should be cut off and he should be banished for ten years." The provosts were charged with the duty of enforcing this, and the confiscation of moneys played for. On the 15th of June, 1691, Louis XIV. forbid the officers and soldiers of his army to play at "faro, basset," and several other games named, under the severest penalties. All intendants of armies, civil magistrates, and military provosts were directed to see this edict put in execution.

It seems curious to find almost contemporaneously with this, in the Duke of Marlborough's orders for his army in Flanders, the following regulations: "That no gaming be allowed anywhere, but at the quarter-guard." This, no doubt, was kept at license under the observant eye of a provost.

In 1638, in his commission to the Earl of Arundel appointing him general of the army, Charles I. named Essex as lieutenant-general, and Holland as master of the horse, and immediately followed these appointments with this authorization, "and further, we do give you power and authority to appoint within our said army a provost marshal, to use and exercise in such case as you shall think fit." The office must then certainly have been considered of great importance in the army, since the right and custom of appointment by the Crown was thus reserved to it. The assistants to the chief may have been commissioned officers, but it is certain that the provosts on duty with regiments were not.

Coming to a more modern epoch, let us learn how that great

soldier, the Duke of Wellington, depended upon this office. His dispatch, written while yet Sir Arthur Wellesley, to Lord Castlereagh, Secretary at War, dated Abrantes, Portugal, 1809, leaves no uncertainty on this point. Urging the difficulties he found in convicting criminals before regimental courts-martial as they then stood, composed partly of enlisted men, and also that the law in this respect ought to be amended, he thus expresses himself : " When the army is on foreign service, one, two, or three officers ought to have the power of trying criminals, and punishing them instantan. Besides this there ought to be in the British army a regular provost establishment. All the foreign armies have one. The French their "*Gendarmerie National*," the Spaniards, their "*Policia Militar*," while we, I am sorry to say, who require such an aid more than any other nation of Europe, have nothing of the kind, except a few sergeants who are taken from the line and are probably not very fit for their duties. The authority and duties of the provost ought to be recognized by law. By custom, the provost has been in the habit of punishing on the spot (even with death, under the orders of the Commander-in-chief) soldiers found in the act of disobedience of orders, of plunder, or outrage. There is no authority for this practice except custom, which I conceive would hardly warrant it. Yet, I declare I do not know how the army is to be commanded at all, unless the practice is not only continued, but an additional number of provosts appointed."

Lord Castlereagh replied that he had consulted many authorities and "was quite clear upon the practice, in all times past, of summary punishment for marauding when armies have been in the field on actual service. It was done by the Duke of York, Sir Ralph Abercromby, and in the last campaign, by Sir John Moore." He thinks "all commanders find this necessary to the discipline of their army, and has no conception that a British army can get along without it," and adds that, "no one doubts it would be clearly competent for the general commanding to punish with death, upon his own view of the guilt. But whether he could delegate such power to his provost marshal is more questionable; the Commander-in-chief thinks he could, according to the usages of war." His lordship proceeds to express his regrets at the innovation on the mode of constituting courts-martial in the mutiny act of the year before, and his hopelessness that Parliament will tread back in its steps to resume, from force of argument, what it had yielded to theory, being composed, as it

was, of non-professional men. This consideration should not, however, he says, alter the grounds on which summary punishment is to be justified, and proceeds to sanction any increase of the provost establishment Sir Arthur might find requisite.

The summary powers of the law martial were exercised by the Iron Duke without flinching throughout the Peninsular war through his provost establishment, resting solely upon the prerogatives of the Crown, and the customs and usages of the service. To relieve commanding officers and the provost marshals from responsibility in the summary punishments, Parliament in 1813 authorized the assembly of detachment courts, and again in 1829, by enactment, gave sanction to drum-head courts-martial on the line of march. These were, in effect, summary courts. Besides, an Article of War was incorporated, carefully defining the duties of the provost marshal.

With these traditions and customs came the provost marshal to our Colonial Armies. He was relied upon with his disciplinary powers alike by Washington and Lord Howe about Boston, by Gates and Burgoyne, by Green and Cornwallis. He was with Jackson at New Orleans and Scott in Mexico. But it was in the War of the Rebellion that he reached the supreme efficiency for which its gigantic scale gave vantage ground. Here he comes into view on two distinct fields, meeting very different opportunities. On the one, as the true soldier with the armies in camps and at the forefront of battle. On the other, with less martial aspect, as the more civic chief who, with his functionaries, ubiquitous over all the land, enforced at the homes of the people the obligations of citizenship and patriotism.

In this latter association, the office became exalted and familiar to the nation. The duties were new, and never before considered an adjunct of this office. In this field, the Provost Marshal General might as well have borne the title of High Sheriff or Commissioner for Recruitment. But President Lincoln vested this in a soldier, and right loyal and able was he in his undertakings.

The war had progressed into its third year. The mighty struggle was depleting the armies, voluntary enlistments languished, and enforcement of the draft became law under the act of March 3, 1863, for "calling out and enrolling the national forces." A bureau of the War Department was instituted. Its chief, with the rank of colonel, and very soon with that of briga-

dier-general, was named "Provost Marshal General." To this post the President could appoint or make a detail. Colonel James B. Fry, Assistant Adjutant-General, who, as chief of staff to General Don Carlos Buel, had, in campaign and in battle, shown executive ability and professional knowledge even with that exacting commander, was duly detailed. Immediate organization followed. An assistant Provost Marshal General was also detailed from the army in each loyal state. In every congressional district was placed a provost marshal, with the rank of captain, with a board of two other persons, one a medical officer, as enrollment officers. Their assistants were in every township. All men between 20 and 45 years of age were enrolled, exempts were stricken off, and classifications made according to age and circumstances.

To supervise this was a mighty task. Question on question arose as to interpretation of law or application of fact, often taxing the attainments of the broadest publicists. Dr. Leiber wrote a pamphlet of many pages to determine what tests should apply to the question of what constituted a residence.

The President's call for men had, under the stimulus thus made, been well answered by volunteers, but finally a draft had to be made. How many should be required from a given locality? Manifestly, a number neither greater nor less than was in the due proportion of its enrolled population to that of others. What men had gone out before, from all localities, had to be ascertained. But some had gone for three months, some for nine, some for a year, and some for three years. So, a due equalization of credits with every State, county and town had to be calculated. The Government received a bonus of \$300 for each substitute accepted. These moneys had to be accounted for. Returns, reports, correspondence, daily multiplied.

Nothing but the best business ability and inflexible will kept the vast machine to its work. It touched the lives and the property of the public. It had to resist the assaults of the devil and the wiles of the wicked. For its protection and aid an invalid corps, with a distinctive uniform, was organized of officers and men who had been disabled in service. These regiments and companies, under the orders of the Provost Marshal General, were stationed in cities at draft rendezvous, and along the lines of communication to the primary bases of the armies in the field.

The last act of Congress concerning this bureau, enacted July



25, 1866, directed that the provisions of the pension laws should be extended to include benefits to those killed or wounded in the discharge of their duty. To a provost marshal, those of a captain. To a deputy provost marshal, those of a first lieutenant, and to all enrolling officers, those of a second lieutenant.

There was yet a very last act, however, of the year following, which authorized the publication of the extensive medical statistics of the bureau, upon which, as chief medical officer, the late surgeon-general, Baxter, had imposed his immense personality. This he made the shore from which to plunge through a sea of troubles, but only to land, at last, an exhausted swimmer.

General Fry's report with his recorded orders is a monument to his creative power and industry, and a manual to any successor, should there ever be one. The Provost Marshal General is never again likely to bear the same burden. There was little of the military element in it, which could not as well have devolved upon a Department commander. Another enrollment and draft is unlikely. An unpopular foreign war is impossible, and we will not endure the thought of a domestic one.

Let us turn to the provost marshals in the field with the armies. Acquaintance with their duties is of far more professional importance. What were their functions? Did commanders learn to rely on them?

We learn, from general orders, that provost marshals were installed, seemingly, with every large command. We find them with the Armies of the Potomac and the Cumberland, and the Department of the Missouri, in 1862. With the Departments of the South, Gulf, Kansas, and the Army of the Tennessee, in 1864, and the Departments of Louisiana, Mississippi, Virginia, and the Army of West Virginia, in 1865.

Winthrop, after remarking that such an officer is not now known in our army, in a footnote thus states what his duties were. "Every duty, indeed, which did not clearly fall within the specialty of some particular branch of the service, seems to have been devolved upon this invaluable class of officers."

"Among their occupations may be noted the arresting of marauders, stragglers, deserters, soldiers without passes, spies, disorderly persons, persons violating the laws of war, prisoners of war without paroles, the supervision of paroled prisoners, the execution of sentences of death and imprisonment, the examination of deserters from the enemy, the control of the business of

sutlers and other traders, and the issuing of passes and permits. The care of captured property, the administration of oaths of allegiance, the regulation of the delivery of mail and express packages, the circulation of newspapers, the protection of private property, the protection of elections, etc., etc."

Very numerous illustrations, in all these particulars, can be culled from the history of almost any of our armies, on the pages of the Rebellion Record. That of the Army of the Potomac is perhaps the most luminous. Let us, hastily, learn something of how it was with this army.

General McClellan, on coming to the command at Washington on the heels of Bull Run, immediately made Andrew Porter, Colonel 16th Infantry, Provost Marshal. All regular infantry and cavalry there, were placed at his bidding. He accompanied the army to the Peninsula, but on its withdrawal, ill-health compelled him to relinquish the post, when it fell to subordinates.

Aside from having assigned educated officers and his best troops to this duty, General McClellan records his testimony to the great importance these details were as a means of discipline. After Antietam, he saw the necessity of a vigorous and able head to this work, and honored himself by the wisdom of the selection.

Brigadier-General Marsena R. Patrick had been commanding a brigade in McDowell's corps, and had won the commendation of his chief for bravery and skill on the field of battle. His training at the Military Academy (class of '35) and in the Mexican War had been strengthened and enlarged by the added wisdom of ten years of experience in civil life. In ability and experience he was then, in that army, the peer of any. His career in his new office, to which he was ordered February 13, 1863, amply justified the choice. He was the only chief of a department on the staff who survived to its end the vicissitudes of that army. The returns from the Army of the Potomac show his usual command to have been, for this duty, a brigade, consisting of three to five regiments of infantry with a regiment or so of cavalry. His force encamped, habitually, closely in rear of the army. He was attached to the general staff and subject to orders only from headquarters.

Habitually, there was at each corps headquarters an Assistant Provost Marshal General, with command of a battalion of infantry, and at each division a provost marshal with one company.

These subordinate commands were not part of a complete organization, but were details made by their respective chiefs to whom they were subordinate, and bore only a *quasi* relation to General Patrick. He apparently, however, had them under close observation. We find him suggesting to the commanding general that commanders of corps and divisions be instructed to cause their provost guards to be encamped directly in rear of their line of battle on approaches. That the provost marshals remain, habitually, with their reserves, and that they be required to know where the hospitals for their commands are placed, and to visit them occasionally and clear them of skulkers.

Returns of casualties show that these commands did not, because in rear, escape scatheless. Every general engagement occasions them a percentage of losses. Their duties were laborious. Detachments were made frequently for various purposes, and often within the zone of combat.

When the hostile armies were confronting each other on the Rappahannock in 1863, outpost duty became monotonous and even demoralized. With certain commands intercommunication and even trading became common. It was evident that the enemy thus obtained valuable information concerning rations, ammunition, and the like, even of movements of commands indicative of projected plans. The provost marshal had to be invoked, and only by means of secret communication with servants and men in disguise could the guilt be fastened upon the proper parties.

In a letter of May 21, 1863, General Patrick complains that the privilege officers had of giving permits for the transit of table luxuries had become an enormous evil, loading down steamboats and trains with unnecessary articles, and says: "I regret to say that the evil is with the officers who give orders for unreasonable purchases, and to the commanders who endorse them. Frequently the allowance of liquor for one officer, per day, on these orders, is from one to three bottles of whiskey, besides fermented beverages additional. The vast number of purveyors, traders, messengers, clerks, employés, etc., hanging upon this army are a curse to it; and refugees from taxation and conscription at home are fattening upon the plunder obtained here."

An important movement of our own cavalry was first known to our infantry line by means of communication with the enemy's pickets. This fact is referred to General Patrick to be investigated.

Preliminary to the movement on Chancellorsville, General Hooker directed General Patrick that he have all traders and pedlars, except authorized sutlers, with their goods, on penalty of confiscation, outside the line of the army within twenty-four hours. Also, by General Hooker's orders regulating the dispatch of flags of truce, he is authorized to countersign letters and communications which may be proper to pass under the flag.

Frequently in battle, as at Chancellorsville, we catch here and there the figure of the man toiling like a giant in the turmoil of strife. At 10 o'clock, General Hooker telegraphs to Butterfield, chief of staff, still north of the river, to hurry up Patrick and his force. He replied, "he is already at United States Ford." There we find him regulating the crossing, ordering the disposition of prisoners, and hurrying up a detached brigade. Then, later, Lieut. Randall reports, that when ordered with certain reserve artillery to Hooker's headquarters on an obstructed road, no one but Patrick could have cleared the road, with enemy's shells falling thick and fast around, at the same time coolly ordering the repair of the telegraph line. At night-fall, as Stonewall Jackson was smashing Hooker's right flank, behind it was the gallant man guiding the stream of fugitives to some order, placing batteries, and stemming the tide with established lines. Again, in the night, he is back at the ford, bringing confusion into order, giving right of way to the batteries which were to cover the return, meanwhile laughing at the lamentations of the infantry colonel because cut off from the battery he was to support. After the battle, his deputy provost marshal general, Colonel G. H. Sharpe, is sent within the rebel lines, with the surgeons, to bring in our wounded, under a flag of truce, for which he has to corduroy roads and build bridges.

Coming to the Gettysburg epoch, we find him directed, June 29, 1863, by Butterfield, to use his cavalry to drive all stragglers and drunken soldiers out of Frederick, Md., and send them to their commands. On the same date, he is directed to send, that night, to Hanover, Greencastle, Gettysburg, and other towns in the vicinity, and get as much information as he can of the number, position, and force of the enemy. After the battle, he addresses a letter to General Meade suggesting that evils be remedied as seen in rear of the field of Gettysburg. "Large numbers of enlisted men were out of the line of fire, in charge of pack-mules, officers' horses, mess establishments, company and

regimental property, as well as guards of general officers. Also pioneer detachments, regimental bands and field music entirely unarmed." He advises that "corps and division commanders be required to point out to their provost marshals, respectively, their lines of battle as soon as formed, that their guard may be deployed in rear, at proper distances, to check disorder, and in a crisis to be put in with the troops." Further "that provost marshals should be, habitually, with their reserves." They should know where the hospitals of their commands are, and by frequent inspections prevent stragglers and skulkers from getting there.

On the morning of July 5th the provost marshal's department, from an examination of prisoners, was able to report to General Meade of the retrograde movement then begun by Lee's army, the roads on which his sick and wounded were moving towards the Potomac, and the route of his trains. This was only obtained by trained and diligent intelligence, well kept in hand during and after the turmoil of so great a battle. He also, when the army marched from the field, made a contract for the complete burial of the dead.

Secretary Stanton, in August, 1863, refers to General Meade a complaint of certain newspapers that they were debarred from circulation in the army. General Patrick is able to inform him that newspapers are supplied to the Army of the Potomac in accordance with a contract, awarded after advertisement to the lowest bidder, at \$50.20 per diem, which amount is paid into the General Hospital fund. That, in order to meet this, the contractor is stimulated to bring his newspapers into camp with great avidity, and follow in its movements. The limit, in price, is five cents a paper, and to prevent a monopoly, a register is kept of papers wanted with each command.

Likewise, being required to report as to sutlers, he replies, "sutlers wishing to bring goods to the army submit invoices covering one month's supplies, approved by their immediate commanders, and to the Provost Marshal General for final approval. The goods, on arrival, are examined and verified. Very frequent confiscation of unauthorized articles occurs." By correspondence with General Hunt, Chief of Artillery, General Patrick arranges what number of sutlers shall be with the reserve artillery.

A report made by General Patrick of the number of deserters returned to the Army of the Potomac from July 1, to December

1, 1863, shows, returned, 2465; found guilty, 402; sentenced to be shot, 94; shot, 25; tried, 842.

It is to be noted that confidential circulars as to movements of the army, when addressed exclusively to corps commanders, were also sent to the Provost Marshal General, of so much importance was he. It became his duty, in 1864, to authorize and limit sales of food to citizens rendered destitute by the march of the armies along certain regions.

On the day Lieutenant-General Grant assumed command of the Army of the Potomac, at Culpepper, Va., April 4, 1864, the Provost Marshal General seems to have received a check. He had directed that all sutlers should leave the army by the 16th. As this might give notice of intended movements, this act was countermanded by the general. Every commanding officer was required to send to the Provost Marshal General any citizen within his lines without authority, who was directed to put such at hard labor on the government works, or in the Q. M. Department. On March 9, 1864, the authority heretofore given the Provost Marshal General, on the approval of corps commanders, to grant permits to ladies to visit the army, was revoked.

His report of prisoners captured from May 1, to Oct. 30, 1864, shows 15,373, and that a permanent record was made in each case. May 31, 1864, General Grant telegraphed to General Abercrombie at the White House, "I want all stragglers who go to the rear apprehended, and sent back to the Provost Marshal General, General Patrick. When commissioned officers are so apprehended, cause their buttons and shoulder straps to be publicly cut from their coats, and send them here, with their hands bound, for trial."

July 4, 1864, by General Grant's order, General Patrick's authority was extended to include all the armies operating against Richmond, including their lines of communication with Washington and Baltimore. On the receipt of this order, General Meade writes the Lieutenant-General that he "trusts it may not be necessary for General Patrick to remove his headquarters from here to City Point. I consider it essential that the Provost Marshal General of this army, whose duties are intimately connected with its police and discipline, should be permanently with these headquarters, and with the telegraph and deputies. I see no reason for the separation of General Patrick." Whereupon, General Grant telegraphs that "Patrick need not move until I see you."



These incidents, selected from a great number, indicate, somewhat, the labors that crowded upon this officer with the Army of the Potomac. They show little, however, of the patient skill and industry, day and night, unceasing, which went on with the examination of prisoners and deserters, nor of the battalion of spies and scouts to which he gave constant employment. From these sources, principally, came the information of the forces and position of the enemy.

A great, voluminous correspondence shows that it was to the Provost Marshal General that the chiefs of staff looked for knowledge of the strength and place of each regiment in the Confederate army. The solicitude of that officer is vividly shown. Again and again he urges that prisoners and deserters "be not kept a moment at the outposts," but hurried to him, because, "under their first excitement, they are more candid, and have not time to destroy their badges, or means of identification." The records enabled him not only to keep a classification showing the numerical strength of the enemy, and also to give an estimate of the morale of individual organizations.

With the disbandment of the volunteer army, the provost marshal likewise vanished. Singularly, while he grew to lofty proportions in the literature of the war, he dwindled to a shadow on what was left printed for our guidance after it. Three Articles of War were devoted to him in the Regulations of 1861. Our present ones vouchsafe him only a mention in the 67th, making him a mere jailor.

Under the general head of "Police," in the Regulations for 1861, the General-in-chief, or the general commanding a division, was authorized to appoint a provost marshal, with a suitable force for the reception and care of prisoners. Our present regulations ignore even this much, and are silent on the subject.

Apparently, the cause is allied to a rare bit of political history. The bill for the reorganization of the regular army, from the military committee of the House in 1866, embodied a paragraph establishing a Provost Marshal General, with a bureau charged with the recruitment of the army and the subject of desertions. General Grant had written a letter giving, from his experience of the war, his endorsement to this purpose. Hon. Roscoe Conkling, then a representative, had, from his relations as attorney to transactions of the Provost Marshal General's bureau within his district during the war, become embittered towards its



Chief, General James B. Fry. Him he attacked in a vigorous and vindictive speech, together with the whole project. The Hon. James G. Blaine, then also a member, immediately entered the lists to the defense of the general. Whereupon, there grew up between these giants of debate one of the most bitter, vituperative personal contests ever heard upon the floor of Congress. It was resumed, at intervals, for days, and contributed, in its results, to most melancholy events; the retirement of one from public life, the defeat of the other as a presidential candidate, and induced, it is believed, in the crazy brain of Guiteau, the horror of an assassination. Despite the efforts of General Schenk, chairman of the committee, and others, the provost marshals project was defeated past resurrection.

In his "Own Story," written after his experiences, General McClellan, in his chapter on army organization, finds necessity for this establishment, and with his usual synthetic method, classifies its duties, including nearly all of those mentioned by Winthrop as given above. He does not include, however, the secret service with spies, or the information to be found with prisoners.

Of this, the author of the recent work entitled "Security and Information," justly observes that "the Provost Marshal General should superintend the secret service. The chief of the secret service should be a peculiar combination of detective and general. It is not sufficient that he should be a detective alone. The chief of McClellan's secret service was a well known and skillful detective, yet that general seemed to be, to an unusual degree, the victim of misinformation in regard to the movements, and especially the numbers of the opposing army."

No function of the army, of any like importance, falls into absolute disuse in time of peace. Of necessity this is the case. The histories we have so hastily sketched show that in war, with an army in the field, it must come to instant revival.

After these many years, the Provost Marshal General is recognized again as a possible adjunct of the army. The President of the United States, last year, put his authoritative seal to that valuable little work, "Troops in Campaign." Under the title "Commanders" comes, in time of war, the Provost Marshal General, with a closely defined list of duties for our instruction. Of these there remains but one thing to remark. The customs of war have sanctioned the provost marshals in the infliction of punishment upon offenders whom they may detect in the actual

commission of crime. The 164th of the British Articles of War is declarative of this. Not so our Articles or instructions. Possibly, with our "Summary" or "Field Officers," and other courts, no such sanction will be needed. We believe it the part of wisdom to follow the English example, but this only the experience of actual war can determine.

This collation, here submitted, bears its own lessons. An officer should bring to this duty a wide acquaintance with affairs; with mind and body trained for labor. In widely different fields of labor, the two provost marshals we have cited were summoned to duty with our armies. Fortunate were our chiefs in their selection. General Fry's labor in the Cabinet will stand a great precedent for the future, if ever needed. General Patrick was a model for emulation. He adorned his office. Gifted with the promptness of a vigorous character his urbanity enabled him to gain the affection of the army, while he was a scourge to its weaknesses. His comprehensive mind, great intelligence, wide sagacity, profound insight into human nature, and military knowledge, with a figure gracious and commanding, made a combination most rare. He survived to old age amid troops of friends. The Army of the Potomac could well say to him, as did the Duke in "Measure for Measure,"

"Thanks, Provost, for thy care and secrecy.  
We shall employ thee in a worthier place."

## Comment and Criticism.

(The remarks under this head have, generally, been invited by the Publication Committee, which desires that, as far as practicable, these "Comments" should appear under authors' names.)

### I.

#### "The Evolution of Cavalry."

Colonel A. K. Arnold, 1st U. S. Cavalry.

I HAVE read with interest Captain Hatfield's excellent resumé on the "Evolution of Cavalry" in the January number of the JOURNAL of the M. S. Institution and desire to express my appreciation of the article. It is a very concise dissertation on the history of cavalry and covers the ground from the first employment of the horse in war to the present time.

The only comment I desire to make is, that I do not believe he has given full credit to the cavalry as to its *use* mounted in the late War of Secession. His reference to the use of the sabre would lead one to suppose that nearly all the fighting was done on foot. I am willing to admit that it did do a vast amount of fighting in that manner, owing to the nature of the terrain and disposition of the troops on one side or the other, but when there was a possible chance to meet on favorable ground, a great deal of fighting was done as cavalry in its proper rôle. Witness the battles of Gaines' Mill, Chancellorsville, Brandy Station, Gettysburg, Yellow Tavern, Trevillian, the daily combats along the base of the Blue Ridge during Lee's invasion of Pennsylvania, Sheridan in the Valley, Custer returning from Charlottesville, Stone River campaign, the numerous cavalry engagements during Sherman's Georgia campaign, and Wilson's expedition against Selma.

Many other notable instances could be enumerated on both sides, but a sufficient number have been given to demonstrate that the sabre played no insignificant part during the war—the occasions being many where it was used.

### II.

#### "The Company Mess."

Captain W. H. Carter, 6th U. S. Cavalry.

ABOUT five years ago, while on reconnoitring service, I was invited to visit the State camp at Peekskill, then occupied by the Seventh Regiment. Fully appreciating the fact that in event of war the State would not do itself justice if it failed to provide the majority of this regiment with commissions, I expressed my astonishment that the regiment did not handle its own rations, merely for the sake of giving experience to officers and men. I could not advise that the military instruction for the week in camp be given up by members for the purpose of becoming cooks, for each company could hire suitable men for that purpose; but I do regard a knowledge of the ration, its issue, and preparation with the limited facilities to be had on the march, of very great value to any one who contemplates going to war.

Having made this as my only criticism upon the New York State camp, it was with much consternation that I saw the general mess system being grafted on to the regular army. It was all right to build fine mess halls for large recruiting depots, but the construction of these expensive plants at old posts already provided with company mess halls and kitchens, does not commend itself as a matter of economy, or as regards the future well being of the service. If looked at from the standpoint of economy alone, we have hardly enough data as yet to make any argument, but my personal opinion is that a general mess for a twelve company post is more expensive than company messes. Efficiency for war at a moment's notice, should, however, be the only criterion in our service, and a great majority of line officers believe this condition is fulfilled by the company mess.

The mess building at Fort Leavenworth cost about forty thousand dollars. It is a first class building in every respect, and is a credit to the post. It has only been in operation a few months, and while much dissatisfaction existed at first, the men have gradually gotten used to it. If their opinion were asked, I believe they would unanimously elect to return to the company mess. The affairs of the mess have been under the supervision of an energetic officer peculiarly fitted for the business. The regulations allow two dollars each day for payment of employes, which is allotted to one steward at fifty cents per day, one assistant steward at ten dollars a month, and four cooks at thirty-nine, twenty-six, twenty-five and twenty cents per day each. I think any experienced person will admit that the entire sum would be very small compensation for a good chief cook. It must be remembered that this mess is for seven hundred men. In addition to these men there are twenty assistants without pay, who act as waiters and kitchen police for periods of ten days. The Government provides no pay for cooks, and the money must be obtained from the sale of part of the rations. Now the value of the ration at this post is  $13\frac{7}{10}$  cents, or, for seven hundred men, \$96.25 a day. I am of the opinion that if sufficient compensation were given the employes the soldiers of this command would fare very poorly, were it not for the aid given by the much berated post exchange. Then again the theory that a lot of cooks are being trained is entirely exploded. The officer in charge gives it as his opinion that the assistants can learn nothing about ordinary cooking unless a range is run in conjunction with the steam cooking plant, competent, well paid instructors provided, and men anxious to learn and available for long detail are selected,—a combination of desirable things not yet brought about.

The number of men excused from military duty is about the same as when company messes are in operation. The only feature of economy visible, may be fuel and ranges for companies, and that would require close calculation. It is a great relief to captains to have a general mess, for they are relieved from much annoying green-grocer work, peddling savings and hunting for good cooks who are willing to stay in the kitchen and be called up at three o'clock in the morning. It is therefore reasonable to say that the objections to post messes by company commanders arise from other considerations than personal comfort.

The ability to look after the food of his men, being a very essential qualification, should be cultivated by every officer. But how are young men coming into the service to learn anything about such matters, unless the opportunity is presented to them in their own companies? How can officers be expected to teach others, at critical moments, what they themselves do not understand?

It has frequently happened in frontier service that rations in bulk are shipped to commands operating in the field. As ration tables and regulations are not always at hand, the presence of men accustomed to draw rations at frequent intervals is very necessary, for few officers can write down the ration allowance from memory. Old

soldiers are not as numerous in most companies as they ought to be, and it would appear to be good policy to accustom recruits from entry into service to look to their company organization for everything.

The old saw quoted by Lieutenant Stottler about our army being the best fed in the world, may be true, but I doubt if the majority of our men have been accustomed to any plainer fare in American homes than the army ration furnishes.

There is a good deal of error in computing the food value of a ration. Theoretically the meat allowance is ample, but when it is considered that the Subsistence Department, by law, accepts the lowest bid for beef without any stipulation that it shall be well fed, it will be readily understood why extra beef has to be bought by every mess. When grass is abundant, range cattle are fit to slaughter, but during the dreadful droughts which at various times prevail in the vicinity of frontier posts, no range beef should be issued to troops even if "it is the best the market affords from the range."

The vegetable ration was opposed by the Subsistence Department for years, because it was feared that it would be impracticable to issue to northern posts in winter. The law having been passed, the difficulty has been generally overcome, to the great benefit of the soldier.

Now that railroads have penetrated all parts of the West, the market for company savings has been nearly destroyed. For some reason or other, local merchants appear to be able to buy supplies at such figures as to undersell companies. This is one reason why canteens were so gladly welcomed; for the division of the small profit on goods sold, helped to replace the lost income from savings. This peddling of savings was one of the first things that seemed strange to me on my entrance into the service, and even now I see no reason why a sufficiently varied ration could not be issued, so as to do away with so much outside exchanging. At all posts where I have served, the Subsistence Department has insisted on the issue of pickled pork, when the actual cost to the Government, including transportation, was greater than beef or mutton. No company ever uses pickled pork if it can possibly sell it.

On the subject of gardens, I have never heard but one opinion from company officers and soldiers,—those most interested,—and that is in favor of company gardens. I never knew of a post garden, pure and simple, that was not a failure. Apparent success has been frequently made, but examination generally discloses the fact that each company was responsible for a specific portion of the ground; in other words, that the post garden was a group of company gardens. If a post mess exists, a post garden might succeed, but with the company messes, company gardens should be the rule. The argument applies to troops and light batteries as well as to companies, but general messes might be acceptable to sea-coast garrisons or foot artillery.

#### Captain M. C. Foote, 9th U. S. Infantry.

In this article Lieutenant Stottler strikes what seems to me to be the key-note of all the objections to the post mess; and in speaking of the "company organization being complete in garrison and field," says rather sweepingly,—*"It is evident that this independence and mobility will be entirely destroyed under the general mess system."*

Those who have followed the fortunes of the U. S. Army since the war days have seen so many reforms that were sure to entirely destroy something or other, that it is a wonder there is anything left. If these direful predictions had all proved true, or if half of them had, our poor army would have gone to pieces long ago. But we seem yet to live and move and have our being, in spite of the fact that these reforms were forced upon us. And it is due to these reforms that we have not stood marking time with smooth-bores, or retrograded, as most institutions do that fail to progress.

"The company ordered away from the mess cannot take the *chef* with it." No, but it can take its assistant cook, or the two, three, or four of them that have been on duty as such in the post mess.

Why? is it "useless to say that by detailing men from each command as assistants, the companies would in time have trained cooks." Not trained, it is true, as some company commanders seem to expect, but certainly as well trained as the average company cook.

We have heard before the stories about requisitions for cooks being filled by men who stated they had passed their time peeling potatoes and washing dishes. I do not think that company commanders generally expect to get trained cooks from the recruiting depot messes. I do not see why they should expect to. And here is where one advantage of the post mess is apparent;—we cannot get trained cooks or even good cooks for every company in the army, whereas it may be practicable to have our Subsistence or Quartermaster's Department furnish one trained cook for each large post where there is a general mess.

Now we come to the old cry,—what will the company do when it goes into the field? Why do not some of the "kickers" point out definitely wherein anything about field cooking is learned at the company mess, that cannot be learned as well in the post mess. The place to learn field cooking is in the field; and if companies are sent out for even a few days every summer, they can soon learn all the mysteries of field cooking, and even the non-commissioned officers can keep up their knowledge of the component parts of the ration and be able to tell if the commissary sergeant tries to cheat them in the issue. It does not take very much training for cooks to boil beef and beans, or even to make boiled coffee in a camp kettle.

Let company commanders who served during the war recall their experience of field cooking and messing. With one or two wagons at most to a regiment, how much of a cooking outfit did each company have and how often was it that we had no wagons for days at a time? What did we do then? American adaptability was equal to the emergency, and every man made his coffee in his own tin cup and fried his bacon on his tin plate, or with a forked stick; this, with his hard tack, completed his "mess system" till the wagons came up again. It did not take very long to learn this either, for as early as the spring of 1862, men in the Army of the Potomac carried their little bags of coffee and sugar, and their ration of raw bacon in their haversacks, and for days during their change of base from the Chickahominy to the James, if each man had not "run his own mess," he would have found starvation nearly as potent a foe as the rebels who were after us. And these men were raw volunteers who were on their first campaign. Cannot our regular soldiers take care of themselves as well?

With one assistant detailed from each company, changed as often as necessary, if the system is properly carried out, the companies can always have one or two cooks as competent as the average we now have, who could do all the cooking required in the field.

As for the other matter of handling the ration, there are various ways in which the non-commissioned officers can be taught that. The steward of the post mess is a sergeant detailed from one of the companies. An assistant steward should be detailed monthly,—from the companies in turn,—who would also be a non-commissioned officer, and if he could not learn all there is to learn about the ration in a month, he would scarcely be fit to hold his warrant. All the non-commissioned officers could be taught in the company school just what the ration is, and, if necessary, something about handling it.

Par. 271, A. R., does direct company commanders to supervise the cooking and messing of their men. But if we commence at Par. 242, and read carefully on to Par.

278, then glance over a few hundred other paragraphs and read various and sundry orders and circulars, we will find that company commanders have some other things to do. If the company commander takes the time necessary to make out bills of fare, instruct cooks, and superintend the cooking to the extent Lieutenant Stottler seems to think necessary or advisable, I am afraid some of the other duties would have to be neglected. The company commander is not always blessed with a clerk who can keep correctly all the twelve books in a company, and make out all the returns, reports, and papers required; and possibly the first sergeant is only kept as such because there is no material to make another. And this very point that the cooking and messing should undoubtedly be carefully supervised is an argument in favor of the consolidated mess. It is all very well to talk about what a company commander must do, but we must come down to what he can do, and do properly.

There are some instances where company commanders are so situated and so constituted, that in addition to the proper performance of their other duties they can, if necessary, stand over their cooks and instruct them; but for many and obvious reasons this condition of affairs does not obtain as a rule. The company is short handed in one way; one, or both, of the lieutenants are at a military college, West Point, Willet's Point, Fort Leavenworth, one of the recruiting depots, or absent in some manner; the first sergeant is not always competent and reliable; the company clerk is wanting; the captain has no idea about cooking or arranging the diet table, and cannot be made to spend the time necessary to attend to it; whatever the reasons are there are generally plenty.

While it would not be impracticable to find one or two officers in every regiment, or at every large post, fitted, capable, and willing to thoroughly supervise and conduct the affairs of a large mess, such an officer could be excused from many minor duties and so have plenty of time to devote to this important one. With these facts in view I think company commanders could look with favor on a system that relieved some of them of duty which might be distasteful, or that they might perhaps consider burdensome,—seeing it better and more uniformly conducted in another manner, and leaving them more time to devote to other duties, without its being any indication that they sought to evade duty, or needed "a rest cure and nusses."

Give the post mess a chance and see how it will work before "kicking" it out of existence. There are plenty of ways to keep companies up to the knowledge of field cooking and handling the ration. If a company does not maintain its mobility and independence of action in this, as in other matters, it will be the fault of the company and post commander, or something lacking in the manner of conducting the post mess, not the fault of the system.

Some officers think that a community mess, as they term it, would destroy the *esprit* of the company,—that they would all be herded together in a large mess-hall, and lose touch with each other. I do not think that, for they would only be together during meals, and then each company would have its own tables. The unity of the company would remain the same in the barrack rooms. The post exchange is a community affair in the same sense that a post mess is, but it does not seem to affect the *esprit* of the company. In the post mess hall, one, if not two, officers would be present during each meal, which is manifestly not practicable at company messes, where often a whole company is annoyed by the improper behavior of one or two men.

The large posts we are gradually establishing at central points would, in case of war, or internal disturbance, be depots for the concentration of troops, or for organizing volunteer regiments. Extensive mess buildings, and plants capable of expansion would be desirable to have at these points, where cooking could be done and bread baked for a large number of troops in case of sudden emergency.



It is very requisite and necessary, as Lieutenant Stottler says, and as the regulations direct, to have the cooking and messing of all the companies properly supervised and attended to. The question is, how can it best be done? If the present system is considered perfect, let it alone; but if it can be improved upon, as many think, by adopting a uniform system where all share and share alike without manifest injury to the service, then give the post mess a fair trial.

**Capt. F. H. E. Ebstein, 21st U. S. Infantry.**

Any paper that treats of the "Company Mess" forms interesting reading, and an interchange of opinions on this important subject cannot fail to be a benefit to all concerned.

The fact is incontrovertible that, in the hands of a competent cook supervised by a conscientious company commander, the ration will be more palatable, more nutritious and more satisfactory, than when these necessary elements are lacking. The most careful management on the part of the captain, even if aided by the most approved of cook-books will, however, fail to obtain the desired results if the cook be inexperienced or incompetent. To instruct and train a certain number of men in the important duty of preparing the ration must be the constant endeavor of the company commander.

Nearly every company has at least one man among its members who has some experience as a cook. By placing as assistants, under instruction of this man, only those men who show an aptitude for cooking, and by replacing these from time to time by others, a number of cooks sufficient for the needs of the company can be trained.

With our peculiar system of company funds,—arising from savings on the ration, exchange and bakery dividends, resources of the garden or receipts from company amusement rooms,—there must of necessity be a great variance in the messing of different organizations. This in a great measure is due not only to variability of receipts from the above sources but also to difference in prices prevailing in various parts of the country. With equal resources a company stationed in a region where beef can be bought for 5 cents a pound or less, eggs at from 8 to 10 cents a dozen, etc., will live better than one so located at a post where the same commodities command prices of from 50 to 100 per cent. greater. Notwithstanding these differences I find that our men live well; that the food is uniformly of good quality, fair variety and ample in quantity and, moreover, satisfactory to the men. Exceptions to this rule are rare. Grumblers there will always be and these are, not infrequently, old soldiers who have perhaps served at some post where, by reason of large revenue, cheapness of prevailing prices, or both, it has been possible to supply the mess with certain extras,—luxuries perhaps,—that under other and less favorable conditions cannot be furnished. Every organization has its two or three vexatious fault-finders and when, as in case of a post mess, we multiply this number of groundless grumbling by the number of companies at the post, we find at once a possible reason for the dissatisfaction with so many post messes.

Lieutenant Stottler errs, I think, in ascribing a large percentage of desertions directly or indirectly to the poor food of the company mess. Some years ago, as recorder of a court of inquiry at Jefferson Barracks, Missouri, to investigate the causes of desertion, I interviewed a considerable number of convicted deserters, in the guard-house awaiting transfer to the military prison, as to the causes of their desertion. Not one of them gave dissatisfaction with the ration as the cause. As these men belonged to various companies throughout the service and had already been convicted and sentenced, fear of their officers and non-commissioned officers certainly was not a factor in governing their statements.

The prescribed ration for the army is ample and sufficient in quantity. It is also

of uniformly good quality except in the one important component—beef. I venture to assert that in nine-tenths of our military posts the beef furnished is unsatisfactory. Lieutenant Stottler erroneously lays the blame upon the receiving officers. From personal experience I have found the beef question—that is, the effort to get good beef from contractors—to be the bane of commanding officers, post commissaries and company commanders alike. True, the contracts provide a presumed remedy, namely, authority to purchase, in open market at the expense of the contractor, whenever the latter fails to furnish satisfactory meat, but outside of the few posts situated near large cities, the authority is, to a great extent, inoperative, as the contractor is usually the only butcher in the vicinity. Hence when meat is rejected the commissary is powerless to enforce this provision of the contract and is compelled to allow the contractor to replace rejected beef by other and more acceptable meat only to have a repetition of the same trouble a few days later. As a rule beef contracts are let at very low figures and the contractor hopes to make his profit by securing the acceptance, as often as possible, of inferior meat. I believe it is a mistake to execute contracts for fresh meat for a whole year. Within so long a period fluctuations of prices seriously affect the contractor who in submitting his bids, usually three months before the close of the fiscal year, must make calculations some fifteen months ahead. Neither the Government nor the troops are the gainers by this method. Beef contracts should be made for no greater periods than two or three months. The contracts should set forth, specifically, the kind of meat to be delivered. Beef "of good quality" is not sufficiently specific. Contracts should contain a proviso that "whenever the beef delivered is, in the opinion of a board of officers and the commanding officer not of proper quality, the commanding officer shall at once direct the post commissary of subsistence to supply the deficiency by purchase in the nearest available market, the additional cost, including transportation, if any, to be charged against the contractor."

All posts should be supplied by the Subsistence Department with a cooler or refrigerator such as is used in butcher shops and large restaurants. Beef delivered by the contractor should have the date of butchering on a tag attached to each quarter and should be kept in the cooler at a uniform temperature for eight or ten days before issue to troops. Ice can ordinarily be furnished from the post supply but in case this is impracticable there should be authority to purchase. In this manner the most valuable and nourishing portion of the ration would reach the soldier in a way at once acceptable, palatable and profitable.

Coffee parched in ordinary baking pans by company cooks is frequently unevenly roasted and produces an unpalatable beverage. A roaster such as found in nearly all grocery stores should be supplied to each post and the coffee issued to troops by the Subsistence Department fresh roasted.

### III.

#### "The Municipal Neutrality Laws of the United States."

Lieut. Arthur Murray, 1st U. S. Artillery.

AS Capt. Carbaugh well says, the receipt of an order by an army officer to "take care that the neutrality laws of the U. S. are preserved" would generally "produce about the same amount of astonishment and agitation as would a thunder clap from a clear sky." His article, therefore, ought to be particularly interesting to every officer who may possibly, at some time, receive such an order.

An officer, "unlearned in the law," on receiving such an order, would first have no little trouble in finding out the particular laws he is called upon to preserve, and then

if by chance he ascertained this, not a little more in determining how he is to do it. The statutes relating to neutrality laws are pointed out by Capt. Carbaugh, and what an officer receiving such an order should do, is stated in general terms by him.

As shown by the portions of the statutes quoted and italicised by Capt. Carbaugh, the duties of an army officer would ordinarily be confined to preventing the carrying on of any military expedition or enterprise begun or set on foot against any nation or people with whom the United States are at peace. In short, it is his duty to "nip" such expeditions "in the bud."

The difficulties the officers who took part in the Garza movement encountered, are graphically portrayed by Capt. Carbaugh. How well those officers performed their difficult duty is known to all who are informed as to what they did.

After an officer called upon to preserve the neutrality laws has learned what those laws are and what he is required to do, he should, as explained by Capt. Carbaugh, set forth in quest of enterprisers. Having found one or more of the latter, the next question would naturally be, "what shall be done with them?" If the officer has been provided with the "advisable and satisfactory addition" of a U. S. marshal, the answer is, Let the marshal arrest them under protection of the military. If the "satisfactory addition" is wanting, it is, as stated, the duty of the officer to turn over to the Federal civil authorities the persons arrested and properly captured, as soon as convenient, with proper complaints. The turning over of the arrested parties to the civil authorities ends the duty of the officer in regard to these persons, unless he is called upon to give evidence against them upon their trial.

To warrant an arrest, the officer should be satisfied that there is reasonable and probable ground for action, and once satisfied thereof he "should not be deterred by presupposed actions for trespass or damage; by slander or libel; or by danger of making false arrests."

With regard to the opinion of the Attorney-General quoted, viz.: "An armed body of men organized with a view to invade the territory of a neighboring people with whom we are at peace and to forcibly resist the public authorities therein, if opposed, may well be deemed a military enterprise in contemplation of the statute (sec. 5286), though the ultimate object is plunder,"—it is thought that while this opinion might possibly warrant an officer in arresting bands of "cowboys" organized for a raid across the border, it would prove a very difficult matter to convict them, if arrested, of violating our neutrality laws. To secure a conviction the proofs must show, as charged by Judge Maxey in the case of Ybarey cited, that the expedition was of a military character and that its object was hostile to a government, or people with whom the United States are at peace. How a raid of a band of cowboys whose "ultimate object is plunder" could be shown to be a "military enterprise in contemplation of the statute" is difficult to see.

#### Lieut. William E. Birkhimer, Adjutant, 3d U. S. Artillery.

Captain Carbaugh's article is both interesting and instructive; interesting, because the subject of enforcing our neutrality laws may at any time become of vital importance to line officers; instructive, because the instances cited are typical cases of this kind, and bring practically into view the rights, duties and obligations, of army officers when thus carrying the rule of the sword, if need be, over the civil community.

Historically also, the subject of our neutrality laws is interesting. The necessity for them was first prominently brought forward, under our Constitutional government, in the famous case of Citizen Genet, the French minister, whose machinations against our peace, and in favor of the French Republic, President Washington so promptly and effectually frustrated. Nor is it scarcely credible, at this day, that the straightfor-

ward course of the Father of his Country in this matter could have been found fault with by a large portion of the American people. Still, such was the fact; the rising political party of which Mr. Jefferson subsequently became the head, condemned the patriotic measures thus adopted in most unmeasured terms. Here may be seen the germ of that combined French-Socialistic and American-buccaneering spirit, which has rendered the enactment of United States neutrality laws necessary.

Our neighbors both on the north and south have had cause to complain many times of the disregard, on the part of American citizens, of their neutral rights; and, although the Government always proceeded promptly to head off hostile expeditions when apprised of them, these occurrences have been the source of bitter feelings, and on more occasions than one have involved us in dangerous international complications. Such was Burr's conspiracy; the numerous unauthorized petty invasions of Florida while a Spanish province; expeditions in aid of revolted Spanish South American States, which seemed to have the moral support of a large part of the people of the United States; the too many filibustering expeditions against friendly Central American States; the piratical expeditions in aid of Texas independence, against the friendly power of Mexico; and, last to be mentioned but not least, the encouragement crazily given to the alleged patriots in Canada, terminating in the, to us, humiliating and tragic event commonly known as the "Affair of the Caroline." In all these transactions the United States gained nothing but dishonor; and, besides, excited the animosity of the various governments adversely affected; so it is no wonder that we were aroused not only to placing on our statute books penalties for the punishment of those who jeopardize the peacefulness of our foreign relations, but that the government has set itself in earnest about enforcing these laws. Of the latter the Garza movement and the *Itata* affair dwelt upon by Captain Carbaugh afford recent and satisfactory evidence.

The sweeping provisions of Section 5287, Revised Statutes, regarding the employment of the armed force of the Union to sustain the neutrality laws, are at once interesting and instructive. "It shall be lawful for the President, or such other person as he shall have empowered for that purpose, to employ such part of the land or naval forces of the United States, or of the militia thereof," to enforce the laws. Here is authority for placing the armed force of the nation under, not military officers necessarily, but any person, civil officer or otherwise, whom the President may choose. The recent Hawaiian episode, in which a civilian, whose official status at the time and since is matter of doubt, was virtually placed in command of the navy on that station, illustrates with what facility this can be done in our service. Whether or not warrant for this procedure is sought for in this section of the Revised Statutes is not known, but probably not. This practice of placing by law, in certain cases, the national military under the orders of civilians, was early inaugurated under our Government; but it was not adopted without an acrimonious struggle between political parties, each of which, in its turn, found itself constrained to adopt the measure, and each of which, in its turn, was denounced by the other for so doing.

The practical duty of enforcing the neutrality laws by the military is a delicate one. The officer who so acts as to escape prosecution in the civil (as distinguished from military) courts for supposed invasions of the rights of citizens, on such occasions, may consider himself fortunate. But the experience of a century has greatly ameliorated the condition of officers in our service who thus temporarily are required to place and keep the civil subordinate to the military power. This is due to a variety of causes. The military, particularly the army, in this country, have won their way to favor against inveterate prejudice; because they have never trampled on the rights of the people, and the latter know it; and, although in maintaining the laws against evil-doers, enemies

have been made, the law-abiding part of the community—the vastly preponderating portion—have, from the same circumstances, learned to respect, rely upon, and feel proud of the regular forces, army and navy. Judges have partaken of this sentiment. They have learned that the judiciary and the military in this country, far from being antagonistic in their views, labor together, though by different methods, to the same end,—the maintenance and vindication of the Law, the protection of life and property, the promotion of order. As a result, the courts are now inclined strongly to view charitably the acts of officers who may be laboring not only to enforce our neutrality laws, but to preserve the peace against the plottings of the turbulent elements, come from what quarter they may. If all signs do not fail, there will be more need of the court's acting by this rule in the future than there has been in the past.

Brought upon the field and compelled to support the majesty of the law, it becomes of first importance for the officer to understand what principle shall be his rule of action; so that, acting up to it, he may on the one hand efficiently execute the onerous task imposed by his superiors; and, on the other, be able to justify his conduct, should the latter be called in question before the civil courts. It is believed that the rule laid down by Capt. Carbaugh is the correct one. The officer must, in proceeding against individuals, have reasonable and probable cause for believing that they are transgressors in the eye of the law which is being enforced; and if, in so proceeding, he acts with discretion and common sense, exerting himself to ascertain all attending facts, and thus arrive at a correct understanding of the actual circumstances, he would not become liable to civil action if it subsequently should transpire that appearances had deceived him, and that he had in fact acted upon a mistaken view of the case. On the other hand, he would not be shielded by the letter of the law, if, under it, he abused his power to purposes of oppression. For unwarranted conduct the civil as well as military courts may hold him to strict accountability.

#### IV.

### “‘Extended Order’ and ‘Skirmish Firing’ Assimilated.”

Lieut. J. T. French, Jr., 4th U. S. Artillery.

**I**N the system of instruction suggested by Lieutenant Blow, published in the January JOURNAL, a few details in which there is a departure from the drill regulations are noticed.

The degree of preparation stated as necessary before beginning the combined practice is not all that is necessary, unless the drill on the parade ground has taught more than Lieutenant Blow leads one to expect; then, too, instruction on varied ground cannot be given on a parade ground, and surely ought to be given an important place in the preparation for “individual skirmish firing”; so, too, all movements in extended order, to include the company, without cartridges and with blank cartridges, seem to be essential before the company skirmish firing is commenced.

To consider next the company advancing in three échelons. According to the drill-book, the first lieutenant commands the reserve, the second lieutenant the firing line when it consists of only one section, or of one section from each platoon. According to Lieutenant Blow's plan, the firing line advances under the second sergeant, the support under the first; but a few lines further on it appears that when the support has come up on the firing line, both lieutenants are there too. Whether this is the error of the writer or the compositor it seems of little consequence compared with naming the captain as commander of the reserve. The captain must not remain with the reserve, nor in any sense be considered as having only that portion of his company under his command. He must follow up and direct the action of the whole com-

pany. His post is near the support, but he must at all times be free to go wherever his presence is necessary, and this might be on the firing line.

The distances passed over in the first rushes are rather greater than contemplated in the drill-book, but the object in this practice is training, and the distances are not made unreasonably long.

At 550 yards the whole support joins the firing line, and, again, the whole reserve goes in when the rapid fire is ordered, thus providing for reinforcing the firing line but twice during the advance. It would be better training to reinforce with part at a time. As for the distance that the support will carry the firing line forward, 50 yards seems like an over-estimate, but even if it is, the principle that the impulse received by the arrival of a reinforcement should carry forward the firing line is well brought out.

To execute "First platoon, *rush*," as explained, will find the first platoon advancing before the second is ready to fire, while if the rushes are executed according to the drill-book, the firing of the first volley by the second platoon will be the signal for the first platoon to rush, the preparatory commands for which should have been given in time; and, if smokeless powder is not used, this first volley, besides its effect on the supposed enemy, furnishes a screen for the commencement of the movement.

As for the length of the commands and the difficulty of making them heard, the command "Advance by rushes," seems brief enough for the necessary preparatory command and is not a difficult one to give distinctly. The platoon to fire and the number of volleys ought to be designated before designating the one that is to rush, and perhaps designation of the latter might be omitted in the commands, but that would leave no direct command for it to advance.

In executing the rush, if the platoon commander, or any one acting as leader, is to be in front, he must delay the rush until he can get there, and must very promptly get out of the way when the halt is made, the command for which will be "Fire by platoon," or some other preparatory command for firing.

Perhaps the platoon commander could select the ground for the halt better from in front than from in rear, but this seems doubtful if he gives the necessary attention to what his platoon is doing. At any rate, if anybody should be in front as leader, let it be the platoon commander, not the first sergeant; and, considered as a cue, the practice of using it at drill seems tended to lessen its desired effect.

Allowing 40 seconds between signals for rushes is not so good as allowing the same time between signals to halt, for the firing of the first volley by one platoon is a signal to rush as already stated.

To cause the charge to be sounded or executed immediately after the rapid fire at 200 yards is teaching a wrong principle. The distance is too great; the first part of it should be passed over in double time, not at a charge.

The general scheme presented by Lieut. Blow, giving to the extended order drill the incentives and objectives of skirmish firing, or giving to the skirmish firing a more strict application of the principles of the drill, is one, the practical value of which seems obvious; not only this, but the drill book leads up to it as its natural supplement.

Without some such combination, efficient instruction in extended order, beyond what can be given without ball cartridges, is a simple impossibility.



## V.

## "Army Organization." (Capt. Zalinski.)

Lieut. Geo. B. Webster, 1st Infantry, N. G. Missouri.

I HAVE read with great interest Captain Zalinski's able article on Army Organization, and Gen. George W. Wingate's comments thereon—especially those parts of both relating to promoting the efficiency of the National Guard and the development of the military strength of the country outside of the regular army.

Captain Zalinski's suggestion that the youth of all the schools and colleges be instructed in military science and tactics is a most admirable one, free from all objections and entirely practical. It has the twofold advantage of being productive of much good without any great expense. It would create a large body of men thoroughly trained in that branch of education, the importance of which is recognized by every other nation.

There need be no trouble in obtaining instructors, for, in the vicinity of an army post, some officer willing to act in that capacity could be found; indeed, I have never yet found an army officer who was unwilling to assist in the advancement of military education among civilians. And, failing that, there are plenty of competent National Guard officers, equally willing. I am sure that there is no officer in my regiment who would not be glad to devote his spare time to so worthy an object. Such a plan could not interfere with any rights of the States, but on the contrary would furnish a most fertile field in which to recruit their National Guards. I sincerely hope, as one of those citizen soldiers who loves his sword next to his home and family, to see the day when this idea shall be put to practical use.

Another matter of equal importance, it seems to me, is the coöperation of the army with the National Guard. This will do more towards establishing and maintaining the desired degree of efficiency in the latter than anything yet suggested or proposed.

At every encampment of State troops there should be united with them regular troops of the same arm of the service. I know that I voice the sentiments of every other National Guard officer, who has had the opportunity to observe, when I say that such an arrangement is beneficial and instructive to both.

While on duty with the Second Infantry, National Guard of Missouri, it was my fortune to be in command of a company of that regiment at its summer camp of instruction some two years ago. Although it was impossible to have even one company of United States Infantry encamped with us, there were a number of experienced non-commissioned officers from Fort Leavenworth ordered to report for duty at the camp. One of these was assigned by the colonel commanding the regiment to each company. They messed and were quartered with the men and drilled with the companies to which they were assigned. Nothing could have been of greater benefit to that command. Our men soon picked up many little points which months of talk and work in the drill hall would not have taught them. These non-commissioned officers became a sort of object lesson to them, being more among them than their own officers. While we learned much from the able officer and courteous gentleman detailed as inspector by the War Department, our men learned even more from the non-commissioned officers.

If a like idea were carried out at every National Guard encampment, I have no doubt the same excellent results would follow. Besides this, there are many other ways in which the army can be of great assistance to us, such as in practice marches, reconnoissances and short scouts with us, where they are possible. Some provision might also be made to allow National Guard officers the benefits of the many excellent papers read by army officers at the lyceums.



I believe the true aim and ambition of the National Guard should be to establish and maintain that degree of merit and efficiency which will enable it to respond promptly to any call for its services, and to perform fully the duties for which it was created. Let all competitive and exhibition drills be done away with and the time spent upon them be devoted to the drill in extended order, rifle practice, guard duty and the street riot drill.

Let the worth and ability of our organization be known and it will soon meet with the recognition—financial and otherwise—which it deserves.

## VI.

**"Is the Three-Battalion Organization the Best One for Us?"**

**Capt. F. H. Edmunds, 1st U. S. Infantry.**

**I**N the JOURNAL for January, 1894, under the heading of "Comment and Criticism," there appears an article entitled, "Is the Three-Battalion Organization Necessary for Us?" intended as a critique of a paper in the July, 1893, number of the JOURNAL entitled, "Is the Three-Battalion Organization the Best One for Us?" as well as of an article under the same caption in the November, 1893, JOURNAL. Captain Wagner selects a new text and then proceeds to criticise. It is held that the substitution of "necessary" for "best," places the matter in an entirely different light. This substitution makes it possible to argue the subject under entirely diverse conditions; "it is an apple of another tree." The title of the original article was a subject of much consideration by the author, and it was his aim to use the words, the interpretation of which could be best supported by the conditions prevailing with us. "Best" and "necessary" are not synonymous. "Best" was used in the sense of "to the most advantage," and it is claimed that the arguments of the author support this definition of the word. On the other hand, it is held that the reasoning of Captain Wagner supports the interpretation of "necessary" as, "impossible to be otherwise." This explanation is entered into, because it is believed that the arguments advanced in support of the original proposition have not been carefully considered by any or all the authors of articles written as criticisms of the original, and which have appeared in various numbers of the JOURNAL since July, 1893. To my mind all the gentlemen who have written on the subject have allowed the idea that because the three-battalion organization is recognized by the leading military nations of Europe as best adapted to the conditions prevailing with them, and has consequently been adopted by them, we should assume it at once, overlooking the fact, or rather perversely refusing to concede, it would appear, that the conditions with us are radically different, different in this respect:—Let it be taken for granted that the most modern rifles, the question of supply of ammunition, the handling, control and discipline of troops on and off the battle-field, and fire discipline, require for full development the three-battalion organization. As far as these subjects are concerned the arguments which impose this organization on the nations of Europe would also impose it on us. But beyond this point we cannot go. The leading nations of Europe have the laws and system, and rigidly enforce the laws, which enable them to obtain the men necessary to fill their battalions to the required complement, and necessary also to practice the tactics, in every respect, which they have adopted as a necessary adjunct of the three-battalion organization. We have not the men and we cannot get the men; and this is the respect in which we differ. Without the men we cannot make the organization effective. Without the men we cannot effectually apply the principles of the new drill regulation, which we have already adopted. We are "putting the cart before the horse." We have the drill regulations which should follow, or

rather depend upon, our organization. The three-battalion organization is not authorized by law, and even if it were, we could not have the men necessary to make the organization effective or to apply the principles of the drill regulations. It is held that the question of men is of the first importance; having the men, the three-battalion organization necessarily follows of second importance; then the drill regulations in sequence, and the latter will include fire discipline, handling and control of troops on the battle-field, etc. Without a menacing danger, is any person bold enough to say that Congress will increase the number of men? It is believed that the past experience teaches that Congress will not do so. Then to-day we stand in this attitude. We have drill regulations or tactics which cannot be applied in all their details because the companies are too small. We become involved in a war. Let it be assumed that Congress will at once provide the necessary measures to raise men and keep regiments full. We have to apply principles of tactics which we have not practiced, and which require at least two years of diligent practice, in the field at that, to perfect officers, and especially non-commissioned officers and men. Under these conditions, how would the efficiency of our army for use in battle compare with its efficiency under the old organization and the old tactics modified to meet the requirements of conditions which will prevail on the battle field? It is still contended that our troops under the latter conditions will be more effective, and consequently accomplish better results than under the former.

To go on the battle-field with an organization unfitted for the number of men which have, up to the time of war, composed it; to apply under these circumstances tactics which have not been practically tested for lack of men; this, it is presumed, *is* war. On the other hand, to enter on such duty with an organization adapted to the number of men authorized by Congress, and with a system of tactics which is suited to the same conditions, "this," it must be concluded, stamps the man who advocates it as a member for a "backwoods constituency." Why, every phrase of Captain Wagner's article bristles with the idea that we must adopt the three battalion organization because all nations possessing armies have done so. It *must* be adopted for this reason, and notwithstanding the fact that we have not the men, cannot have them under existing laws, and Congress will *not* listen to any legislation increasing the number of enlisted men. Moreover, we cannot prepare the men for battle. This, we are nevertheless called upon to concede, is preparation for "war."

The new drill regulations were adopted in 1891, nearly three years ago. Up to July, 1892, I was stationed at a post garrisoned by one company. In the extended order drill, only the movements by squads and platoons could be practiced, the latter only by regarding the company as a platoon. For a year thereafter my station was a three company post. By combining the three companies, it was possible to have a few company drills in extended order. During the summer of 1893 a board for the examination of officers for promotion was convened at a post garrisoned in part by five companies. For the parade examinations, by suspending the regular drills of the post, it was possible to make up the minimum tactical company, seventy-one enlisted men. But to the best of my recollection now, not one of the seven or more officers called upon to drill this company had ever seen the tactical company. One of the officers, having been for considerable time on Indian duty, had never drilled troops in the new regulations.

The statement, "That during the whole War of the Revolution the American troops but twice used the bayonet to any extent, viz.: at Stony Point and Eutaw Springs," was made advisedly. There was no intention by the use of this expression, or of any other in the article, to underrate the proficiency of American troops in the Revolutionary War, or in any other in which they have been engaged. The statement was made as a fact, as regards the use of the bayonet only, and can, I believe, be substantiated.

The intention was to convey the idea that only in two battles referred to was the result decisive from the use of the bayonet. The opinion is expressed by some persons who took part in it, that the battle of the Cowpens was won by the first line, militia, and the marksmen deployed as skirmishers in advance of it. These marksmen were ordered to reserve their fire until the enemy was within fifty yards, then to retire loading and firing to the flanks of the first line. The first line was ordered to fire two volleys at fifty yards and then retire. The word was passed among the marksmen, "Mark the epaulette men." So well was this caution observed that many officers were shot down and the British thrown into confusion. Still they continued to advance on the second line, Howard's regulars, which, owing to some misunderstanding of orders, faced about and commenced to retire. But the confusion of the British advance being noticed, "the order flew to right and left; face about, give them one fire and the victory is ours, and was reiterated by Morgan as he passed along the line." This order was at once obeyed, the line faced about, delivered one volley, and then advanced to use the bayonet, but "the enemy threw down their arms and fell upon their faces." And Howard exclaimed, "Give them quarters." This unexpected fire sealed the victory. Five hundred prisoners were taken.

The capture of the redoubt at Yorktown by the light infantry under Lafayette, although accomplished without the firing of a shot, could hardly be quoted as an affair in which the bayonet was extensively used. The garrison of this redoubt was considerably less than one hundred men.

The British garrison at Stony Point consisted of over six hundred men. Although a stout resistance was made, the fort was carried by the Americans at the point of the bayonet, without firing a shot, and the entire garrison captured.

Greene's command at Eutaw Springs consisted of about twenty-three hundred men; Stuart's force was somewhat less. At the decisive stage of the action Greene gave the command: "Let Williams advance and sweep the field with his bayonets." The entire second line made the charge and swept the British from the field. The conduct of the militia on this occasion was in marked contrast to the general reputation given them by Captain Wagner. Their gallantry here, as well as at the Cowpens, made possible the success of the regular troops. The British loss in this battle was eleven hundred and ninety-three.

The conduct of the Maryland and Delaware line under DeKalb at Camden, is to be remarked on account of the firm stand made by these troops, and had DeKalb had a larger force the bayonet charge ordered by him would certainly have been decisive. The counter charge made by Cornwallis "was the decisive stroke," and "won the victory."

Colonel Hawkins, in the September, 1893, *JOURNAL*, says, "These views will not be agreeable reading to those who want promotion through the battalion bill. \* \* It is to be regretted that the question which forms the title of Captain Edmunds' article is not discussed by him in its broad sense and as if we had not even the nucleus of an army." In addition to the foregoing on this subject, it only remains to be added, "it is a condition and not a theory that confronts us." Although promotion is "a consummation devoutly to be wished," we should not desire it at the expense of efficiency.

(Authorities consulted. Johnson's *Life and Correspondence of Nathaniel Greene*. Moore's *Diary of the Revolution*. Judson's *Heroes of the Revolution*. Lossing.)

## VII.

## "The Twelfth Regiment of Infantry."

1st Lieutenant C. W. Abbot, Jr., 12th U. S. Infantry.

COLONEL WISTER'S criticism, in the JOURNAL of January, on the "Historical Sketch of the Twelfth Infantry," prepared by me, was doubtless made in all kindness, and is so accepted. I do not think, however, that he understands or appreciates all the conditions and circumstances of its preparation. I wish therefore, in justice to myself, to answer the points he specially makes. The preparation of the sketch took much time, correspondence, and hard work generally, while the materials were very meagre. When the work was begun there was but one officer in the regiment who had served with it during the war,—Captain Harry C. Egbert, now lieutenant-colonel 6th Infantry,—and he was at another post. I did not see him at all during the time of preparation, and he was promoted long before the end. I corresponded with, and am indebted to him for a large portion of the matter pertaining to the war, and the Indian campaign of 1877 and 1878. At his suggestion I wrote to several. Colonel Wister himself kindly responded with his "Recollections of the 12th Infantry and Regular Division," which was made use of to the fullest extent possible, but only embraced a *portion* of the war service of the regiment. None of the others responded with anything pertaining to the war that could be used. Barring the above material, there was literally nothing but the "Rebellion Records," then incomplete, and the regimental returns, all very meagre, upon which to draw for the filling in of the sketch.

Wherever special mention was made of any officer in a report, notice was taken of it. I do not remember that any enlisted man was so mentioned. The records of the regiment now on file at the War Department may be very complete, but they were entirely inaccessible to me, and there is literally nothing except the aforementioned returns now among the archives at headquarters. The omission of many of the names mentioned by Colonel Wister was due to the fact that there was always hanging over me the prescribed limit of 6500 words. As it was that number was exceeded by about half. Mention was made therefore only of the names of the regimental or battalion commanders from time to time, the regimental staff officers, and those killed or wounded while actually serving with the regiment. Of the many gallant officers who were holding volunteer or staff commissions I knew nothing, except the bald statement of their detached service as it appeared on the returns. General Winthrop's death while commanding a brigade was brought to my notice, but omitted, for the reason that he was not then serving with the regiment, and it was thought best in the interests of space economy not to mention it. Of the non-commissioned officers promoted for gallantry or otherwise distinguished I had no knowledge, or mention would gladly have been made of them. In conclusion I wish to say that long before the sketch was finished I was convinced that if one would *successfully* write a history or even an historical sketch of twelve pages for a magazine, he must either have been a participant himself in the campaigns he would describe, or have full access to others who were, to say nothing of all the records. I did the best I could with the means accessible to me.

## Reprints and Translations.\*

### RIFLE-PRACTICE IN ITS RELATION TO EYE-STRAIN.

BY JOHN M. BANISTER, A.B., M.D.,

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*From the American Journal of the Medical Sciences.*

(By permission.)

SINCE rifle practice has become a matter of such vital interest to the officers and enlisted men of the United States Army and National Guard, its causative relation to eye-strain has assumed an importance that demands more attention on the part of the medical staff of both services than has heretofore been devoted to it. Hence, it has appeared *à propos* to the writer to attempt a discussion of the matter, pointing out the dangers of the present system so far as the eye is concerned, and advising such a modification of the system as shall be less likely to cause ocular trouble in the future.

This subject will be discussed under the following heads: I. The defects of the present system in its relation to eye-strain. II. In what respects the present system should be modified.

#### I. THE DEFECTS OF THE PRESENT SYSTEM IN ITS RELATION TO EYE-STRAIN.

##### 1. *As regards the color of the targets.*

The color of the targets, used in known distance firing, is a light buff, the bull's-eyes and rings being black. Light is reflected from these targets with almost as much intensity as from a white surface, and no one can realize the dazzling effect produced unless he has faced such a target for several hours under a bright sun. Then, when we remember that the soldier, or officer, as the case may be, is required to aim at this bright surface, and, in the effort to properly adjust the sights of his rifle upon the target, strain his accommodation in the face of the glare, it is a matter for wonder that even more eyes have not succumbed to such cruel and unwise treatment, which sets at utter defiance the laws of ocular hygiene. At most of our frontier military posts, as well as at the majority of the target ranges of the National Guard, the glare during the target season is intense, and especially is this the case at the posts located in Indian Territory, Texas, Arizona, and New Mexico. In the two last-mentioned Territories, the target ranges—with the whole face of the country, for that matter—are destitute of trees, and, during the target season the ground and the targets are of the same

\* Please address communications concerning reprints, translations and reviews to Lieut. J. C. Busu, editor of this department.

buff tint, with scarcely a trace of verdure to relieve the eye. Imagine one practicing at a light-buff target under these circumstances, with the bull's-eye dancing in the brilliant sunlight as if bewitched! In the case of the scorers, and of the officers in charge of the practice, the inconvenience resulting from gazing intently at these blazing targets is second only to that experienced by the soldiers engaged in firing. Some officers have attempted to secure protection from the intolerable glare by the use of smoked glasses; but this partial relief is denied the marksman, as he must make use of the full amount of visual acuteness in order to fire with the best result. Under such circumstances, any masked refractive error is very prone to manifest itself, with the accompanying symptoms of eye-strain. Such treatment is injurious enough to the normal eye, but it is especially hurtful to the hypermetropic or astigmatic organ.

2. *As regards the damage done to the eyes in cases of refractive error.*

In this connection it seems advisable, as a preliminary, to explain, in a manner that may be easily understood by the general practitioner, what is meant by the terms far point, near point, visual acuteness, accommodation, emmetropia, myopia, hypermetropia, and astigmatism, as a proper appreciation of the meaning of these terms, as well as of the refractive conditions indicated by the last four, is necessary to the clear understanding of the discussion contained in the following pages.

a. The far point is that point for which the eye is adjusted when the accommodation is at rest.

b. The near point is that point for which the eye is adjusted when the full power of accommodation is called into play. For instance, if an individual can distinguish fine print at a distance of eight inches from the eye, but no nearer, then the near point of such an eye is at eight inches.

c. Visual acuteness is "the power of recognizing form," and the standard adopted by oculists is the power of recognizing an object that subtends an angle of five minutes ( $5'$ ) at the nodal point of the eye.

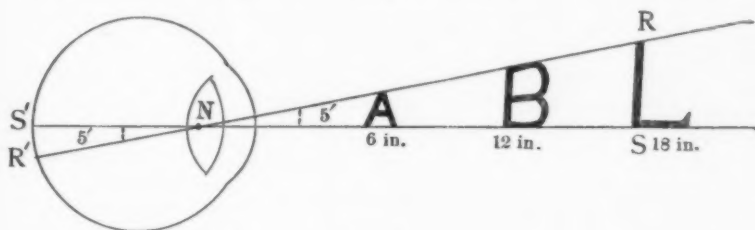


FIG. 1.

In Fig. 1, the point N in the crystalline lens is the nodal point, and the rays RR' and SS', which come from the extremities of the letter L, intersect at this point, and the angle RNS ( $=R'NS'$ ) formed by them at N, is the angle subtended by the letter. An eye that can recognize an object which subtends an angle of five minutes at the nodal point is said to possess the normal acuteness of vision. In the figure, it is evident that the other let-

ters, A and B, subtend the same angle. It requires the same degree of visual acuteness to recognize A at 6 inches, B at 12 inches, and L at 18 inches. It must be distinctly understood that the possession of the normal acuteness of vision, as indicated above, does not exclude the possible existence of errors of refraction.

*d.* Accommodation may be defined as the power possessed by the eye of altering its focus, as may be necessary, for the proper perception of near objects. By the exercise of this power, the refraction of the eye is increased, and near work made possible. Accommodation is due to a little muscle in the eyeball, called the ciliary muscle, which, by its contraction, draws forward the choroid, and thus relaxes the suspensory ligament, or zonula of Zinn, in consequence of which relaxation the inherent elasticity of the crystalline lens is enabled to assert itself with a resulting increase in the convexity of the latter. This increase in the convexity of the lens enables rays of light, emanating from near objects, to be properly focussed upon the sensitive elements of the retina. In the ideal, or normal, eye no accommodation is required for objects at twenty feet or beyond, since, in practical ophthalmology, rays coming from this distance are considered to come from infinity, and, hence, to be parallel, and the theoretically perfect eye is adapted to such rays. This is not true, however, of the eye whose refraction is not normal, as will be explained later on. The amount of accommodative effort necessary for distinct vision within infinity (twenty feet), and the distance of the object from the eye are inversely proportional—the shorter the distance the greater the accommodative effort.

The power of the accommodation does not remain fixed through life, but at the age of ten years begins to decline rapidly and regularly until it reaches the zero limit at seventy-five years of age. The following table gives the power of accommodation possessed by the eye at different ages.\* The letter D means "dioptré," and signifies the refractive power possessed by a lens of one metre (about forty inches) focal length, which is the standard lens of the metric system. This system of designating lenses (metric system) is now almost universally used by oculists, instead of the old inch system.

The excuse for the insertion of this table is the fact that it will be necessary to refer to certain data contained in it at a later phase of this discussion.

| Years.  | Power of Accommodation. | Years.  | Power of Accommodation. |
|---------|-------------------------|---------|-------------------------|
| 10..... | 14 D.                   | 45..... | 3.5 D.                  |
| 15..... | 12 D.                   | 50..... | 2.5 D.                  |
| 20..... | 10 D.                   | 55..... | 1.75 D.                 |
| 25..... | 8.5 D.                  | 60..... | 1.00 D.                 |
| 30..... | 7.0 D.                  | 65..... | 0.75 D.                 |
| 35..... | 5.5 D.                  | 70..... | 0.25 D.                 |
| 40..... | 4.5 D.                  | 75..... | 0.00 D.                 |

It may be well to state here that this failure of the accommodative power with increasing years is due to the fact that the elasticity of the crys-

\* See Landoldt: "The Refraction and Accommodation of the Eye," p. 178.



talline lens progressively diminishes, as a result of which the contractions of the ciliary muscle are not followed by a commensurate increase in the convexity of the lens. In certain refractive conditions, to be explained further on, distinct vision, for both distant and near objects, is possible only at the expense of an habitually increased accommodative effort, by means of which the individual is enabled to overcome his refractive error and obtain the normal acuteness of vision. This statement applies to errors of moderate degree in comparatively young subjects.

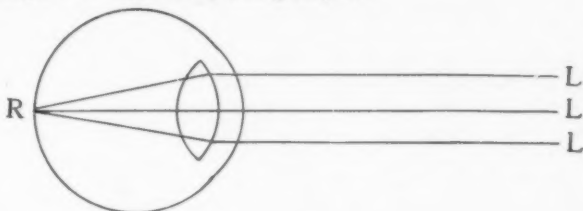


FIG. 2.

*e.* Emmetropia is the theoretically normal state of refraction, and may be defined as that refractive condition which, with the accommodation at perfect rest, permits of the focussing of parallel rays of light upon the retina, or, in other words, the retina is situated at the focus of the dioptric system of the eye. Such an eye is adapted to parallel rays, and the far point is at infinity. This condition is illustrated in Fig. 2. Parallel rays, L L L, are brought to a focus upon the retina at R. In this and the following refractive condition it is assumed that the accommodation is at perfect rest, the static refraction being meant.

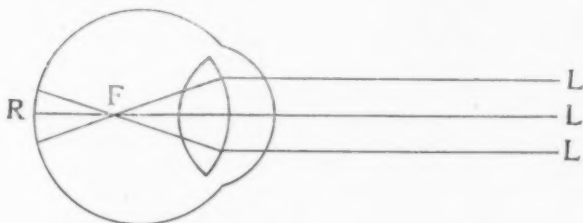


FIG. 3.

*f.* Myopia (near-sight) is that state of the refraction which causes parallel rays to be focussed in front of the retina, or the retina may be said to be behind the focus of the dioptric system, as shown in Fig. 3. In myopia the eyeball is virtually too long in its antero-posterior diameter. Such an eye is adapted to divergent rays, and its far point is at a finite distance in front of the cornea, and positive.

*g.* Hypermetropia (far sight) is that refractive condition in which parallel rays are focussed at a point behind the retina. The retina is in front

of the focus of the dioptric system of the eye. The hypermetropic eye is adapted to convergent rays, which do not exist in nature, and hence accommodation is necessary for all distances, both far and near, since by this means alone can parallel or divergent rays be given the proper degree of convergence to be focussed upon the retina. In Fig. 4 the focus of the dioptric system is at F, a point behind the eyeball, and the parallel rays,

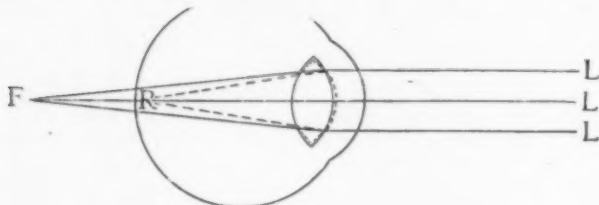


FIG. 4.

L L L, are represented as focussed at this point. The dotted lines show the direction that these rays should take in order to be focussed upon the retina at R, and the dotted curve represents the change in shape of the crystalline lens, under the influence of the contraction of the ciliary muscle, necessary to give the rays, L L L, the required direction.

The hypermetropic eye is too short in its antero-posterior diameter, and its far point is behind the eye, and negative.

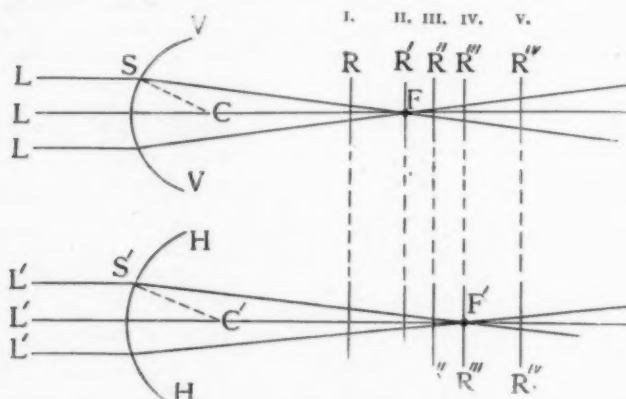


FIG. 5.

*h.* Astigmatism ( $\alpha$ , privative;  $\sigma\tau\iota\gamma\mu\alpha$ , a point) is that refractive condition in which the different meridians of the refractive apparatus have different powers of refraction, and hence the rays of a cylinder of light entering the eye are not brought to a focus at one point. This condition is due to a difference in curvature of the meridians of the cornea. The meridians of greatest and least refraction, called principal meridians, are at right angles

to each other, and the refractive power of the intervening meridians diminishes gradually from that of the meridian of greatest to that of the meridian of least refraction. This constitutes regular astigmatism, which falls within the scope of this paper. It can readily be understood that rays passing through the meridian of greatest refraction will be brought to a focus sooner than those passing through the meridian of least refraction. This, while seemingly abstruse in the telling, can be readily understood by referring to Fig. 5.

Regular astigmatism is subdivided into five varieties, which are individually determined by the relative positions of the retina and of the foci of the principal meridians. From what has been said of the relative positions of the retina and foci of the dioptric system in hypermetropia and myopia, the reader should have no difficulty in comprehending the different varieties of astigmatism as exemplified in Fig. 5 (which is an adaptation from Landoldt).

A single curved surface is here used to represent the refractive apparatus of the eye. Let VV represent the vertical meridian, and be the meridian of greatest curvature, with the centre of curvature at C; parallel rays (L L L) will be focussed by this meridian at F. Now let HH be the horizontal meridian of the same curved surface, and let it represent the meridian of least curvature, the centre of curvature being at C'; then parallel rays (L'L'L') will be focussed by this meridian at F'. It is seen from the figure that the focus F is nearer the refracting surface than is the focus F'. Of course, the planes of the two meridians, VV and HH, are at right angles to each other. Such a condition in the human eye constitutes astigmatism. As before mentioned, the position of the retina with reference to the foci of the two principal meridians determines the special variety of astigmatism in each case.

Returning to our figure, let the screens RR, R'R', R''R'', etc., represent the retina, as it occupies positions I., II., III., etc. Now, if we place the screen at I. (so that it occupies the position indicated by RR), we find that it is in front of the foci of both meridians; hence both meridians are hypermetropic, though in different degrees, and we have an illustration of compound hypermetropic astigmatism. Place the screen (R'R') at II., and we find that it corresponds with the focus (F) of the vertical meridian, which is therefore emmetropic, but is still in front of the focus (F') of the horizontal meridian, which is consequently hypermetropic. Here we have an illustration of simple hypermetropic astigmatism, in which one meridian is emmetropic and the other hypermetropic. At III. the screen (R''R'') is between the foci of the two meridians, that of the vertical meridian being in front of it, and that of the horizontal meridian behind it; hence the former meridian is myopic and the latter hypermetropic, and our figure illustrates a case of mixed astigmatism. With the screen (R'''R''') at IV., it corresponds with the focus (F') of the meridian of least curvature, and is behind the focus (F) of the meridian of greatest curvature, giving us an example of simple myopic astigmatism, in which the former meridian is emmetropic and the latter myopic. If we move our screen (R<sup>iv</sup>R<sup>iv</sup>) still further from the refracting surface, and let it occupy position V., it will be behind the foci

of both principal meridians, and we have a representation of compound myopic astigmatism, in which both meridians are myopic, though in different degrees.

To recapitulate :

- I.* represents compound hypermetropic astigmatism.
- II.* " simple hypermetropic astigmatism.
- III.* " mixed astigmatism,
- IV.* " simple myopic astigmatism.
- V.* " compound myopic astigmatism.

I shall now attempt to make an application to target practice of the facts stated in the foregoing remarks upon refraction and accommodation. From what has already been stated, it can readily be seen that the emmetrope, possessed of normal visual acuteness, can, in aiming at the target, see the bull's-eye distinctly with the accommodation perfectly relaxed, but must make use of this accommodation in order to secure accurate perception of the front and rear sights of his rifle, which are situated at finite distances from the eye. I have determined by experiment, that the average distance of the eye from the front and rear sights of the United States Springfield rifle, when firing in the standing or sitting positions, is 110 cm. for the former and 43.1 cm. for the latter—an accommodative effort, therefore, of 0.90 D, being required in the one case, and 2.32 D. in the other. Under proper conditions of ocular hygiene, the emmetropic eye should experience no trouble from constantly bringing this amount of accommodation into play, but when its use becomes necessary in the face of a dazzling target, matters are decidedly changed. The effect is very similar to that experienced when one attempts to read a newspaper in the bright sunlight, or look fixedly, under the same conditions of light, at a dark object on a whitewashed wall. Such use, even of the normal eye, if continued from day to day, and for an hour or two at a time, for several weeks, will be very apt to bring on serious symptoms of eye-strain; accommodative asthenopia, and congestion of the retina and other structures in the interior of the globe, resulting. Yet this is exactly what the soldier in the United States Army is required to do during the "target season."

In hypermetropia and astigmatism trouble is far more likely to result from this constant firing at the present brilliant target than in the case of emmetropia, just mentioned, for the simple reason that more accommodative strain is required in the refractive conditions.

As before explained, in the case of the hypermetropic eye, accommodation is necessary for all distances, the amount of accommodation required in any given case being dependent upon the degree of the refractive error and the distance of the object viewed from the eye. In looking at the target, which the emmetrope can perceive distinctly without use of his accommodation, the hypermetrope is required to bring into play enough accommodation to overcome his error (or, in other words, to give to parallel rays the degree of convergence necessary to their accurate focussing upon the retina) before he can see the bull's-eye. Furthermore, in adjusting his refraction to the sights of his rifle, the hypermetrope must, in each case, make use of this amount of accommodation (*i. e.*, an amount sufficient to overcome an error).

over and above that required by the emmetrope under like conditions. In other words, a hypermetrope of 2 D. must constantly make use of 2 D. of accommodation in excess of the amount necessary for the emmetrope.

Much greater strain is placed upon the ciliary muscle in astigmatism than in hypermetropia. Of course, distinct vision without glasses is only possible in the lower degrees of astigmatism, and it is of such degrees that these remarks are made. In order to overcome an astigmatism and secure distinct vision, when such a result is possible, certain segments, or zones, of the ciliary muscle must contract more strongly than others, producing in this way a condition of artificial compensatory lenticular astigmatism, if I may be permitted the coining of such an expression, which is the converse of the refractive condition of the cornea, and hence neutralizes the effect of the latter. Of course, the crystalline lens becomes most convex in the direction of the most strongly contracting segment of the ciliary muscle. Since the hypermetropic forms of astigmatism are the kinds almost invariably found in soldiers, the following remarks apply to these varieties alone, mixed astigmatism and the forms of myopic astigmatism being excluded.

This neutralizing of the corneal astigmatism by irregular contraction of the ciliary muscle, as above explained, is, in the case of the soldier affected with hypermetropic astigmatism, necessary in order that he may focus parallel rays upon the retina, or, in other words, see distinctly at twenty feet or beyond. Hence, before he can see the bull's-eye, he must thus overcome his error, and must, in addition, bring into play a general (or regular) contraction of the ciliary muscle, as explained in the case of the hypermetrope, sufficient to enable him to see the sights of his rifle.

From the above description it can easily be understood why the astigmatic soldier is so much more liable to suffer from eye-strain, as a result of rifle practice, than the emmetrope. What was said of the direct effect upon the emmetropic eye of constant firing at the present target applies, therefore, with far greater force to the astigmatic and hypermetropic organs.

So far, it has been assumed that the individuals affected with ametropia have been possessed of sufficient accommodation to overcome their respective errors; but the factor of age must now be taken into consideration. It has already been stated that, owing to a progressive diminution in the elasticity of the lens, the accommodative power diminishes rapidly and regularly from the age of ten years, when it amounts to 14 D., to that of seventy-five years, when it becomes zero. By referring to the table given on a preceding page, it can well be understood how a soldier of twenty or twenty-five years of age, when the accommodative power is 10 D. and 8.5 D. respectively, might easily overcome an error of refraction which would cause great strain of the ciliary muscle, or be insurmountable, by the time he reaches the ages of thirty, thirty-five, or forty years, when the amplitude of the accommodation falls to 7 D., 5.5 D., and 4.5 D.

It is especially in the younger soldiers, who have moderate degrees of refractive error not incompatible with distinct vision under accommodative effort, that we may expect to find asthenopia. By the time these subjects

reach the age of twenty-five years any strain of accommodation is almost sure to cause trouble, for by that time the accommodative power having fallen to 8.5 D., is no longer able to overcome their errors and leave enough accommodation in reserve for constant work. It is a fact well understood by ophthalmologists that, for constant use, a certain proportion of the total range of accommodation (about one-third or one-fourth)\* must be left in reserve, and that all the accommodation can no more be brought into play and kept constantly engaged without fatigue than can any other muscular power.

Now, our soldier of twenty-five years having been during the whole of his previous life accustomed to distinct vision, his visual centres will not brook any dimming of visual perceptions, but demand sharply cut retinal images, and hence the flagging ciliary muscle is spurred on to greater and greater efforts, until severe eye-strain results. In the higher degrees of ametropia (such as would not be likely to be found among soldiers, owing to the examination for enlistment), vision never having been distinct, so much is not required of the ciliary muscle; hence, eye-strain is not so liable to come on. In these cases the visual centres content themselves with the impressions received from the circles of diffusion formed on the retina, and do not realize the need of accurate focussing.

Now, while upon this subject, another element must be touched upon, namely, the part played by the extrinsic eye-muscles in the production of the composite condition called eye-strain. In refractive errors the normal balance between the ocular muscles is not as well sustained as in emmetropia, and, as a consequence, the so-called muscular asthenopia is very prone to occur under conditions of unwise use of the eyes. This condition of muscular asthenopia results in these cases from a disturbance of the normal relations existing between the functions of convergence and accommodation. When this condition is induced in an ametropic individual the state of such a person is far from pleasant. All near work becomes painful; headaches, pain in the back of the neck, dizziness, nausea, and other disagreeable symptoms soon follow any special use of the eyes.

I can speak feelingly on this point, since, in consequence of a season of target practice in 1883, when I stood number one in order of merit in a post garrisoned by headquarters, band, and five companies of the 14th United States Infantry, I developed a condition of muscular asthenopia (insufficiency of the internal recti muscles) which gave me the greatest annoyance for several years. I am a hypermetrope to the extent of 1.50 D., but was not aware of this fact until the eye-strain developed just after the target season mentioned.

Myopia is not frequent among the soldiers of the regular army; indeed, I have never seen a myopic enlisted man whose error was greater than 1 D.; but myopes must be comparatively common among the members of the National Guard, of whom a preliminary physical examination is not usually required. Hence the following statements concerning the effects of "target practice" upon the myopic eye apply especially to the latter organization.

\* See Landolt: "The Refraction and Accommodation of the Eye," p. 339.

In myopia, vision for distance cannot be improved by accommodative effort, since, even with the accommodation at rest, the dioptric system of the myopic eye is already too highly refractive, and rays of light coming from twenty feet or more (parallel rays) are focused in front of the retina, and then projected upon this structure in circles of diffusion. The myope, therefore, only calls upon his accommodation for distances within his far point, which is situated at a finite distance in front of the eye; consequently he habitually makes use of less accommodation than the emmetrope, by the degree of his refractive error. Thus, to read fine print at 33 cm. would require in the emmetrope about 3 D. of accommodation ( $\frac{1}{33 \text{ cm.}} = \frac{100}{33} = 3 \text{ D.}$ ), whereas, in the case of a myope of 2 D., for instance, only 1 D. would be necessary to do the same work (3 D.—2 D.=1 D.); in the case of a myopia of 3 D., no accommodation at all would be needed for this distance (33 cm.) since the individual's far point would be at exactly this distance from the eye ( $100 = 33$ ). In consequence of this diminished use of the ciliary muscle, we find this structure flatter and less strongly developed in myopia than in emmetropia, the circular fibres of the muscle, which are supposed to have most to do with accommodation, being especially defective.\*

A myope of even 1 D. cannot see the bull's-eye distinctly, distinct vision for distance in this refractive condition being only possible with the aid of concave lenses.

The ranks of the National Guard being recruited, as a general thing, from an intelligent class, it is a rule that the myopes of this organization are aware of their ocular defects, and have the same corrected by proper glasses, so that this part of the discussion is narrowed down to the effect of "target practice" upon the myopic eye provided with the proper correction.

Concave glasses, as is well known, call accommodation into play—the stronger the glass the greater the accommodative effort—and frequently myopes, whose accommodative power is not what it should be, cannot stand the full correction, even for distance. Every oculist has frequently in these cases to under-correct, and, moreover, even in moderate degrees (about 4 D.), to prescribe still weaker concave lenses for near work, for, although, theoretically, myopes of about 4 D. and less are supposed to use this correction for near work as well as distance, practically many patients cannot stand the increased accommodative effort necessary in the former case. Hence, such persons are provided with two pairs of glasses—one for distance, and a weaker pair, adapted to the patient's working distance, for near work.

Now, to return to our myopic soldier: suppose him to be moderately myopic, and to wear his full correction in order to see the bull's-eye. Of course, he cannot make use of one pair of glasses for the bull's-eye, and another weaker pair for the sights of his rifle, but must use his full correction for all. Hence, it can well be understood that his poorly developed ciliary muscle may prove unequal to the task when firing at a brilliant target, and accommodative troubles result, as described in the case of the emmetrope. Muscular asthenopia is also apt to occur, but far greater dangers than these menace the myope whose eyes are abused.

\* See Fuchs: "Text-Book of Ophthalmology," pp. 635 and 636.



Myopia is essentially an acquired condition, being rarely congenital. In the immense majority of cases infants are born hypermetropic. The late Dr. Ely, of New York, examined with the ophthalmoscope the eyes of one hundred infants, and found that nearly all of them had "the short eyeball."\* The same results have been obtained by other observers. Now, if at birth the eye is as a rule, hypermetropic, how is it that myopia is induced, or, in other words, what causes the faulty elongation of the globe?

It is the universal opinion of ophthalmologists that the cause of this acquired myopia must be attributed to the constant demands made upon the eyes by near work. In the first place, it is assumed that in such cases there is an inherent anatomical weakness in the posterior pole of the globe, principally located in the sclera, which fact would render the eyeball prone to elongate in this direction, if subjected to lateral compression, or if from any other cause the intra-ocular pressure should be somewhat increased.

Now, in the production or increase of this ectasis at the weakened posterior pole, no matter in what way this weakness may have been induced, we find the following active agents: 1. The extrinsic ocular muscles, notably the four recti, which, when even in their accustomed state of tonic contraction, press upon the globe, but whose action in this regard is greatly increased in the act of convergence for near work. Moreover, the superior and inferior oblique muscles, encircling the globe as they do, compress it at its equator, and thus press upon the points of exit of some of the *venæ vorticosæ* with a resulting turgescence of these vessels in the choroid, and a consequent increase of the intra-ocular pressure.† 2. The exercise of the accommodation, which is held by many authorities, notably Landolt, to increase the intra-ocular pressure. 3. A faulty position of the head and body (as in bending forward in near work, or using the eyes while in the recumbent posture) which causes a condition of hyperæmia in the interior of the eyeball, both from increased flow of blood to the organ and from the compression to which the veins in the neck are subjected, with a resulting increase in the intra-ocular pressure.‡ It can also be well understood how harmful the congestion thus induced would be in case the choroid should be diseased or there should be a commencing posterior sclerotico-choroiditis. 4. Improper illumination, either insufficient (in consequence of which the work is held too near at hand, and the convergence and accommodation increased to a harmful degree), or too brilliant (causing irritation of the eye and rendering the internal structures hyperæmic), or badly directed, as for instance, light shining directly into the eyes, in consequence of the source of light being in front of the individual, which, when conjoined with increased brilliancy, intensifies the bad results of the latter. 5. The traction exercised upon the weakened posterior pole by the optic nerve in strong convergence (Fuchs). In the act of convergence the posterior pole of the elongated globe is turned outward to a greater degree than in the case of the normal eye, and, as a result, the counter-traction of the optic nerve tends to still further increase the ectasis.

\* See Valk: "Errors of Refraction," p. 44.

† See Fuchs: "Text-book of Ophthalmology," p. 639.

‡ See Hartridge on Refraction, p. 145.

Now, place our myopic guardsman, provided with his proper correction, in front of the target and apply the above facts to his case. In the first place, he has in front of him a bright glaring target, at which he must aim (radically improper illumination); in the second, his eyeballs are compressed by the ocular muscles in producing the convergence called for when he attempts to focus the sights of his rifle, especially the rear sight (for, although one eye may be covered by the lid, it will, nevertheless, turn inward from sympathy with the uncovered organ); in the third place, by reason of the increased accommodation rendered necessary by the correcting lenses worn, the intra-ocular pressure may still further be increased; and in the fourth place, by his head being bent forward and turned sideways (generally to the right), in the act of aiming at the target, the bad results of faulty position (congestion of the intra-ocular tissues, both from increased flow of blood to the interior of the eyeball and from pressure upon the veins in the neck) are induced.

Could our myope be placed under conditions much more unfavorable? If he has a tendency to choroidal disease, this may be precipitated; a slumbering posterior sclerotico-choroiditis may be aroused into pernicious activity, with the result of rendering his myopia progressive; asthenopia, both accommodative and muscular, may be caused; and, finally, in older subjects with a high degree of error and fluid vitreous, it is remotely possible that detachment of the retina may ensue.

From what I know of target practice, after over fourteen years' experience as a member of the Medical Corps of the United States Army, I would not advise myopes of a greater degree of error than 2 D. to engage in this military duty.

From what has already been stated, it can easily be understood how the various recumbent positions in long-range firing under the present system of target practice are radically wrong from an eye standpoint. The least objectionable is the prone position, since in this the veins in the neck are compressed to a less degree than in the various back and side positions, and hence there is in the former case less consequent congestion of the intra-ocular tissues. The back and side postures are especially injurious.

## II. IN WHAT RESPECTS THE PRESENT SYSTEM SHOULD BE MODIFIED.

In the first place, the color of the targets should by all means be changed, and the element of glare reduced to a minimum. This can easily be effected by making the body of the target black and the bull's-eye and rings buff. By this simple change the reflection of light from the target could be almost entirely obviated, since the only visible reflecting surface in this case would be the bull's-eye. Every one knows that the black target will absorb light, instead of reflecting it. Another gain in this change would be the greater contrast produced between the color of the target and the face of the landscape, which would be a great advantage at most of our military posts, as before explained.

If any "doubting Thomas" among the members of the shooting fraternity will construct such a target, and place it on a bright day by the side of the present regulation target, he will see the force of these remarks.

It may be claimed as an objection to the proposed target, that such good scores may not be obtained with it as with the one now in use. This objection would prove untenable, since I have had this matter tested practically at the different ranges, with the most encouraging results. I believe that better scores can be made with the black target than have heretofore been possible. Furthermore, the relief to the marksman's eyes would be of incalculable advantage.

At present most marksmen aim at the body of the target just below and a little to the left of the black bull's-eye; with the proposed target the front sight of the rifle could be outlined against the bull's-eye itself, which would simply cause a slight change in the elevation of the piece, and in the "windage" and "drift" allowed for.

In the second place, as some recumbent posture seems essential to good long-range shooting, I recommend, for reasons already stated, that the prone position be made the sole regulation recumbent position, and that the back and side postures be excluded. The evil effects upon the eye of faulty position have already been sufficiently discussed in the preceding pages, and it is now only necessary to refer to this fact.

I desire to say, in conclusion, that this paper is not intended as an attack upon rifle practice, but is written with a desire to obviate the evil effects, as far as the eye is concerned, likely to result from the performance of this military duty.

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## A GENERAL REVIEW OF EXISTING ARTILLERY.

A LECTURE PREPARED FOR THE INTERNATIONAL CONGRESS OF ENGINEERS  
AT CHICAGO,

BY GASTON MOCH, CAPTAIN OF ARTILLERY.

*Translated at the Military Information Division, War Department, A. G. O., Washington.*

Published through the the courtesy of Major Clifton Comly, U. S. Ordnance Department,  
Chairman Division F.—Military Engineering.

DESCRIPTION OF MATERIAL. PRESENT STATE OF THE CONSTRUCTION OF  
ORDNANCE; BREECH MECHANISM.

**A**T first sight, it seems that under this title should be included a comparative account of all progress recently made within the domain of artillery material, both in connection with the details of its organization and of its manufacture; this account should also be accompanied by a recital and discussion of the experiences undergone by the different departments, if it is wished to be able to value them properly.

I do not believe, however, that such is the task that has been presented to me. Such a description would furnish, not the material for a simple paper, but for a bulky work of several volumes, and even then it would be very incomplete—which would be a grave fault in a compilation of this kind.

Those rare authors who have had the courage to approach these questions have produced works of considerable importance; and yet, each of

them, confining himself to an investigation of a very limited part, has been far from exhausting his subject, which in a measure increased as he went on.\*

Here, as in all questions relating to the industrial arts, the most conscientious book is out of date as soon as printed if it makes the pretension of entering into detailed descriptions. To prove this it is sufficient to consider the list of journals and reviews devoted in whole or in part to the questions of artillery material. Their number is considerable and they constantly continue to give new descriptions, although they are far from publishing everything, whether because some one invention seems but slightly interesting to them, or because they do not possess details sufficiently exact regarding some other.†

This latter consideration is of the greatest importance. So far as regards questions of material, those which are the most interesting are pre-

\* Among these works the following may be cited in the order of their dates:

Artillery at the Exposition of 1889, by Capt. Veyrines. (Paris, published by Berger, Levrault & Co.) The very title of this work shows that its subject is quite limited; several of the most important French establishments, as for example Creusot, made no exhibit of war material in the Champ de Mars (Exposition), and the only foreign establishment represented was the Maxim-Nordenfeldt Company.

Die Feld- und Gebirgs-Artillerien der europäischen Staaten im Jahre 1890, by Capt. Jas. Schubert. (Vienna, published by Seidel & Sons.) Here is considered only the material for field and mountain service adopted by European states; that is to say, ordnance, some of which has been old for nearly twenty years. The work is very interesting for a soldier who may have to fight one of these armies, but not for a manufacturer who wants to learn what is new.

Modern French Artillery, by James Dredge (London, Office of *Engineering*), was written for the Exposition of 1889. It is a picture of the French industry of four years ago, in which the conditions give a reason for the same omissions as in the work of Captain Veyrines.

Construction der modernen Geschützrohre, by Prof. Geo. Kaiser (Vienna, published by Seidl & Sons, 1892), is the best treatise upon the construction of ordnance which has been printed for a long time. But this voluminous work still cannot answer, notwithstanding the analogy of its title, the encyclopædic question noted above, of which he treats of only a part. It is more especially a mathematical study of the different parts of pieces of ordnance, with historic and descriptive examples in support. This work considers the means of execution and results attained, rather than the objects sought and the reasons therefor. It relates only to ordnance, properly so called, to the exclusion of rapid fire guns, which are considered, however, in the supplement. But if, for purposes of instruction, it is necessary to separate the piece of ordnance from its carriage, it cannot be so when it is desired to present a connected view of a system of artillery. When Mr. Kaiser's work has been studied as it merits, the manner in which the different constituent parts of a piece of ordnance are made will be understood; but it will not yet be known what a modern cannon is.

† Among the publications most worthy of note, either as monographs or general treatises upon these questions, the following may be cited amongst the most prominent:

Germany: Die Kriegswaffen.

England: { Arms and Explosives.  
              { Engineering.

Austria: Mittheilungen über Gegenstände des Artillerie- und Genie-Wesens.

Spain: Memorial de Artillería.

United States: Journal of the United States Artillery.

France: { Le Génie Civil.  
          { Mémorial de l'Artillerie de la Marine.  
          { Revue d'Artillerie.

Italy: Rivista di Artiglieria e Genio.

Roumania: Revista Artileriei.

Russia: Artilleriskii Journal.

Sweden: Artilleri Tidskrift.

Switzerland: Zeitschrift für Artillerie und Genie.

cisely the ones about which it is most difficult to procure trustworthy information. From time to time are seen in some non-technical journal the details of pretended inventions that the writer generally takes care to attribute to a foreign country, but which, if they existed at all, would simply show the folly of those who adopted them, or even accepted the accounts of them as serious facts; and in the meantime the country pursues, with the greatest secrecy, researches which will lead perhaps to some really important discovery.

2. It would, therefore, be a formidable task to undertake an exhaustive study of artillery material which would be worthy to be laid before a universal congress of engineers, and it would end in a compilation that might tire out the patience of any reader. And besides, it is not even evident who could undertake it with a prospect of success.

At first glance it might be thought that it could be trusted to an officer employed upon technical work, that is, to some one who has had equal opportunities to construct and to use cannon. But an officer is doubly bound to professional secrecy; he can say nothing of the really interesting happenings in his own country, and if he obtains any information in regard to work being carried on in a foreign country, but not yet published, he is equally obliged to preserve it for the benefit of his own country alone.

As to the engineer, the constructor of war material, he is naturally disposed not to look beyond the walls of his own manufactory, or at least not to boast especially of what his competitors are doing; and besides, in his own domain, he is divided between the desire to establish the excellence of his own products and not to reveal the causes to which he attributes his superiority.

Neither officer nor engineer is capable, then! And, however widespread might be the interest in military science throughout the two continents, it would be difficult to find a man who, from purely amateur motives, had made a special study of artillery; and even if this amateur artilleryist existed, his competence would be strongly doubted by professionals.

3. I will add finally that the work, whose difficulty I have just pointed out, would not possess the general interest that is rightfully to be expected from papers read before this assembly. It would appeal merely to specialists.

Now, specialists ask only to be informed of the latest improvements. They know where to find information—at least the authentic information obtainable regarding the subject; they read the publications to which I have alluded above, and do not need a repetition of that which they have already looked up for themselves. And especially is it true that they have at this very moment within their reach the greatest and best of object lessons. In order to learn the recent achievements of mechanical skill it is to the galleries of the Columbian Exposition that they must have recourse, and not to the books written before its opening.

It is true that every one cannot absent himself from his work to visit these wonders; but, I repeat, those who may not have this good fortune will know at least how to find the description that will not fail to be given them by others more favored.

## GENERALIZATION AND ORGANIZATION OF SCIENTIFIC WORK.

4. But it is not enough merely to show what it is not possible to do, or what it is inexpedient to attempt, at the present time; to do merely this would be to betray signally the confidence that has been accorded me. It remains for me, therefore, if not to accomplish, at least to undertake to define what I consider actually possible and, above all, what is desirable.

Here I shall ask permission to appeal discreetly to the authority of one of the most illustrious of my countrymen, whose influence, directly or indirectly, is each day more and more felt in scientific investigations. It is now more than sixty years since Auguste Comte wrote the following: \*

"There is, as yet, but a very small number of minds in the learned world which embrace in their conceptions the entire range of even a single science, which in its turn is merely a part of one grand whole. The majority confine themselves merely to the isolated consideration of a more or less extensive section of a particular science, without greatly concerning themselves with the relations of their individual researches to the general system of positive knowledge. Let us hasten to remedy the evil before it becomes more grave. Let us fear lest the human mind become lost in works of detail."

5. Science has advanced, since 1830, with an ever-increasing speed, and the evil which Comte denounced has increased and become widespread. The founder of positive philosophy had chiefly in view the coördination of the most exalted speculations of the human mind: to-day it is the searcher after details himself who is frequently hampered by the abundance of details already found.

Artillery, as a whole, is at bottom only one of those divisions of science in which the investigator was called to limit himself at the time when Comte spoke. And behold, since then it has been divided into a great number of subdivisions, each one of which is sufficient to occupy a specialist.

One who has devoted himself to interior ballistics possesses only ordinary notions regarding the fire of ordnance and the effects of projectiles; another, who is an eminent metallurgist or mechanic, is ignorant of pyrotechny or has never seen a gun drawn across the fields at a sharp trot over furrows and ditches; or, if he understands the tactics of field artillery, has never seen a modern fortified place or an armored vessel.

And yet he who wishes to establish a system of artillery is in fact obliged to take account of all this knowledge and of much more besides. Not that he must have the information of a specialist in each of the subjects; this, I repeat, has unfortunately become impossible. But he must know and appreciate thoroughly the relative importance of their chief essentials in order not to sacrifice any one of them to the very natural desire of favoring another.

Whoever has had occasion to examine new inventions is in a position to say to what extent remarkably successful details are often associated with really serious faults, which make them notably inferior to other works showing far less brilliant invention in certain respects, but proving more homogeneous as a whole.

\* Course in Positive Philosophy, first lesson.



For example, it is a beautiful dream of all field artillerists to possess a powerful gun that shall have no recoil; but if the unity of the two qualities be obtained by giving to the piece a greater weight than that of cannon in use, which are generally admitted to be rather too heavy, the benefit would be negative.

6. So it is, as I have said elsewhere, that "the conception of a system of artillery is one of the most complex things in existence. Each one of its elements, when once determined, reacts upon the others and contributes in its turn to determine them. So we are brought face to face with a multitude of contradictory conditions, which we must make the best of, by depending in turn upon considerations of tactics, of service, and of industrial possibilities, which compel the reciprocal subordination of the different *desiderata* that are to be kept in view."\* So, then, if you take an officer of troops, a ballistician, and a metallurgist, each of equally high standing in his own specialty, and charge them with the task of preparing a design for a cannon intended for a given use, they will certainly arrive at three results, totally unlike, and each presenting some very marked good qualities and a greater number of grave defects.

I am well aware that these three experts might combine their efforts, and even do well under the circumstances to add to their number a chemist-pyrotechnist, a ship-constructor, an officer of each arm of the service, and a sailor, so as to form a small academy. But the trouble is that such an assembly is useful only for examination and criticism, and not for production. A collective work is never worth as much as that which is conceived by a single mind; it can only take the form of a mixture of heterogeneous elements, brought together, but not assimilated. It is true that most frequently a commission charged with drawing up a design avoids this difficulty beforehand by relying entirely upon its secretary, but in that case we fall back upon the idea of a single author.

The only resource is to demand cannon from those only whose business it is to construct cannon. But it is necessary that these men should know what purposes the cannon are to serve and how they are to be used. With this understanding they will know how to coördinate their efforts; they will be able to give up some idea attractive in itself, but embodying defects more grave than the direct advantages it may carry with it; they will not produce mechanisms for pointing that are marvelously ingenious but incapable of operating after a rapid march of a kilometre across ploughed fields, nor yet with power so extraordinary that the recoil will break their carriages.

#### UTILITY OF A GENERAL VIEW OF ARTILLERY.

7. The time has come, therefore, for a reaction against the scattering efforts which result from specializing to an extreme. In order to do this, specialization is not to be suppressed, but should be organized and directed.

The method which Auguste Comte has instituted in the fundamental sciences, "to make the study of generalities one great specialty more," is a method that ought to be extended to-day to every science of detail under

\*Notes Upon the Field Gun of the Future, paragraph 5.



penalty of ending in complete confusion. Assuredly, artillery does not yet furnish specialties enough to occupy a "new class of scientists" in the study and coördination of their common principles. But it admits even now of enough details to justify the preparation of a synoptical work designed for use as a solid basis for future investigations.

The proof of this is to be seen in the lengthy curriculums of the different special schools: powders; explosive substances; interior and exterior ballistics; description and construction of material of every kind; artillery service in the field, in siege operation, and in coast defense,—all these subjects so crowded together as sometimes to tread upon each other's heels without the natural connection between them being clearly perceptible.

It seems to me that above all these subjects there is a need for instruction in those general principles which comprise, so to speak, the "philosophy of artillery," and are destined to arrange and classify the heterogeneous multitude of ideas now presented in such disorder. The introduction of such a subject of instruction would greatly facilitate the study of the various details, and, eventually, their applications. No doubt this course, if periodically brought abreast of the most recent progress, would be one of the first that specialists would undertake as a valuable assistant and guide to their investigations. He, for example, who had become thoroughly imbued with this branch of knowledge before starting to visit the objects now collected in the exposition, could certainly form a clearer and quicker opinion of what he would see.

8. It is possible that this synopsis of generalities may be considered by many specialists as mere idle verbiage; in this they show definitely how much their minds already feel the lack of a study of this kind. Evidently no project will ever be based upon generalities alone. When it comes to a question of application, it will be necessary to possess more substantial means. But if these means, which are already superabundant, have not been carefully classified, who will be able to find his way among them and to work them into shape?

"It is easy to see," said Comte, "how irrational is this antipathy to all general doctrines which characterizes the greater part of the scientists of to-day. A conception of generalities and a conception of details are equally indispensable."\*

"Scientific specialists," says Renan,† also, "are the great laughing-stock of men of the world, as generalities are the laughing-stock of scientific men. It is a consequence of the deplorable habit which exists amongst us of looking upon what is comprehensive and philosophical as superficial, and upon that which is erudite as dull and unreadable. \* \* \* It is sad to think that three-fourths of the matters of detail which are sought have already been found, while other mines where treasures could be discovered remain unworked in consequence of the unfortunate distribution of labor. Science in our day resembles a rich library turned upside down. Everything exists in it, but there is so little order and classification that it is about as

\*Course of Positive Philosophy, Lesson 50.

†Future of the Science, Chapter XIII.

unavailable as if it were not there. If we reflect upon the subject, we will see that it is absolutely necessary to suppose in the future a great reform in scientific work."

9. So it is that one of the works that is most important to be done at the present time in artillery is a general examination of the essential conditions which each kind of cannon, intended for a given use, must fulfill. The practical object of this examination would be to arrive at a classification of the diverse conditions, both as to their relative importance with regard to final result—that is to say, war—and also concerning their industrial possibilities, considering the present state of the applied sciences.

The first series of considerations is a question of tactics, in the most general meaning of the word, including marches and battles. In this are to be considered all that concerns the mobility of material, the destructive effects required of projectiles, and conditions imposed upon these last by the broad question of supply in its relations to consumption. The study of these different conditions will reveal at first glance incompatibilities that will compel the adjustment of one to the other, and the establishment of an initial limitation to the problem. Thus it is very certain that it would be advantageous on the battle-field to be able to crush one's adversaries under projectiles as terrible as those in use on shipboard; thus a projectile of 34 centimetres, weighing 420 kilograms, could contain, I suppose, 60 per cent. of its weight in balls of 15 grams, which would be 17,000 balls. But as it is impossible either to bring cannon of 34 centimetres upon the field, or to furnish them with ammunition, it is necessary to abandon the wish to employ shrapnel capable of throwing out an entire division at one shot. And, on the other hand, however easy transportation and supply may become, cannon cannot be replaced by mitrailleuses firing musket balls, even though they were automatic.

The tactical study of the material will be relatively brief, for it results not in precise data, since in that case the cannon would be already completed, but simply in extreme limits, leaving more or less latitude between them.

The industrial study, since its object is to fix definitely a choice within these limits, will be much longer and more arduous.

One combination, although desirable in itself, will be found to exceed the limits of technics; another may, indeed, be realized, but must be given up because it will require an inadmissible sacrifice of other particulars; and still another requires parts which are too complicated, too fragile, or too difficult to be used by ordinary gunners. And so the matter will gradually result in abandoning more than one seductive idea, and in being contented with concrete results more modest but practical.

10. This lengthy recapitulation of what seems to me an indispensable preliminary considerably exceeds my means of preparing it. Even were it not so, it would require a considerable amount of time; and I was able to give only six weeks to the preparation of this paper, although six months would not be enough for the adequate performance of such a task. I have, therefore, no idea of writing this philosophy of artillery, which I strongly urge. I consider that I have already done much by showing the necessity for it,

leaving its undertaking to others more competent than myself, and in attempting to give a few examples of general discussions to which it may lead. It is to this last point that I now turn my attention.

#### LIMITS OF THIS STUDY.

11. I shall surprise no one by saying that all countries show themselves to be equally intent upon increasing the efficiency of their artillery. The misfortune is that they agree so little as to the meaning given to the word "efficiency," in addition to the fact that its meaning varies according to the circumstances of the war in which the country may be engaged.

Let me say at once that in every case efficiency implies an element of primary importance, but one which I shall nevertheless not consider here, namely, accuracy.

There are two reasons why I shall omit to treat of accuracy. The first is that great embarrassment is created whenever any effort is made to increase it. It can only be said that the causes and the effects of a quality are known when it is known how to vary them at will, all other considerations being equal. Now, it is well known that accuracy increases with the initial velocity and the weight of the projectile, on condition that the rotation of the latter is properly computed and that its ring holds fast; but that is pretty nearly all that is known about it, and no great result is gained by this statement, since we have already been led to look for these qualities for other reasons. So that a gun that is more powerful than another is usually more accurate. But besides this, there is no occasion to be uneasy about accuracy, because in the present condition of artillery it has already reached as high a point of excellence as it is reasonable to desire.

It may, indeed, be said that for the majority of pieces in existence the accuracy of the cannon is equal, if not superior, to that which might be expected from its aiming. It is particularly good in large guns, where, in fact, we might expect to improve the aiming considerably by mechanical devices; and if it is less in field guns, it should not be forgotten that in this quarter the nature of things will always render aiming less accurate.

12. However, the problem is little simplified by eliminating considerations of accuracy.

We should not know, in fact, where to stop if we attempted to draw up a list of the elements which have the greatest influence upon the efficiency of a gun. I will cite the following, which is by no means a complete enumeration: The living force which the projectile possesses upon arriving at its destination, its remaining velocity of translation and of rotation, its weight, its interior construction and that of its fuse, the number of shots the piece can fire in a given time, the supply of ammunition that can be furnished it, the mobility of the gun and material that will permit it to be moved as rapidly as possible to the most favorable emplacement, its simplicity of construction rendering damages rare and easy to repair.

There is in addition an entire series of factors which I voluntarily set aside, such as the degree of instruction on the part of the personnel, or the actual employment of artillery. And yet it would be incorrect to think that they have no bearing upon the art of the constructor.

If the material part be arbitrarily complicated there will be difficulty in obtaining men sufficiently well instructed to handle it properly; and tactics, on the other hand, being the art of employing artillery in the best possible manner, depends upon and reacts upon the qualities possessed by the gun. A given quality of the gun will lead to a corresponding modification of tactics, which will perhaps prevent some other quality from being made useful. Even if we are to confine ourselves merely to those qualities of material which arise directly from the constructor's art, it has been seen that they are very numerous. The evil would not be great if these qualities were not, in addition, both very complex and dependent upon each other. So it is with the greatest circumspection that any single one of them can be acted upon, if it is desired to avoid falling into difficulties greater than the benefits realized. Besides, their relative importance varies greatly, according as a cannon is looked upon as a ship's gun, a sea-coast gun, a siege piece, a gun of position, a field or mountain piece; and even within the limits of each of these great classes there are wide differences between the individual guns which constitute them.

So it is necessary to examine in detail these reciprocal actions in each particular case. It would, of course, be impossible here to carry the investigation to such an extent. I shall consequently confine myself to applying it in a certain number of examples, selected as the most important and the most characteristic. In this way we shall be able to avoid many repetitions, studying the influence of a given fundamental quality according to the kind of cannon over which the influence is most marked.

Thus, "power" defined by the quantity of living force carried by the projectile, will be studied quite naturally in connection with armor-piercing guns of ships in which it is carried to the maximum. Questions relative to the rapidity of fire will come up, not in connection with sea guns, for which a solution seems to have been reached, or at least appears obtainable with relative ease, but in connection with field guns, where these questions are still under controversy and much more difficult.

Finally, I shall not speak of siege artillery or artillery of position, since these classes are intermediate between sea and field artillery, and, on account of their conditions of position and use, approach steadily nearer those of the last-named class. It is the object of assiduous efforts to give them greater protection, either by the employment of armor or by an increase of mobility in the field. But, although the reason therefor is not apparent, these investigations are everywhere kept even more secret, if possible, than any others; hence there is such a lack of reliable information which can be given out without harm, that our best plan is to refrain from touching the subject.

To sum up, therefore, I shall confine myself to presenting here a few considerations relative to two kinds of cannon which are, so to speak, at the opposite poles of artillery, namely, the great naval guns and field pieces.

## FIRST PART.—HIGH POWER ARTILLERY.

## CHAPTER I.—ARMOR-PIERCING GUNS.

## PENETRATING POWER.

14. Efficiency may be most easily determined in the case of those great guns intended for piercing the armor of ships. These pieces have to fulfill but a single and well-defined object.

It may be said that with them the most efficient gun will be the one which has the least weight and is able in the shortest time to throw the greatest number of projectiles capable of penetrating, at a given range, plates of the highest known resistance.

The distance at which the gun may be supposed placed is a question of accuracy and at the same time of naval tactics and rapidity of fire. The height of the object to be reached is very small, for the armor will emerge hardly more than 50 centimetres from the water; in addition, both target and gun are extremely mobile. In fine, it is useless to be able to pierce a plate at a distance at which there is but a small chance of hitting it. It would even be dangerous to yield to the temptation of firing at it at such a distance, for the speed of modern ships is so great that there would be a risk, after having wasted a shot at too great a range, of seeing the enemy approach and open fire at a proper distance before we were ready to fire a second shot.

The question will therefore be to obtain the distance at which it is desired to be able to pierce a certain thickness of metal, according to what is known of the mean accuracy of existing pieces, and it would seem that the problem of deducting therefrom the ballistic requirements of the desired gun ought to be easily solved.

Unfortunately this is not the case. The problem is indeterminate and can be solved only empirically. In fact, formula for the penetration of plates give the thickness pierced as a function of the remaining energy and of the calibre of the projectile; the latter is unknown, and the remaining energy is itself a function of the quantities sought. We can, therefore, only grope our way by supposing different cannon constructed successively, and by calculating, with the degree of approximation that accords with the series of empirical formula, the penetration which the guns would give. Very simple methods, some of which will be given further on, permit us to form rapidly a sufficiently clear idea of the initial living force that a projected cannon may attain. The formulas of exterior ballistics furnish the living force at impact, and we can see whether this is sufficient to pierce the plate under consideration.

15. However, the examination of the formulas of penetration brings out some interesting laws. They contain in the numerator a power of the remaining living force; and, in the denominator, a power of the calibre. There is, then, something to be gained, as will be evident elsewhere, in increasing the remaining living force; but, in addition (which is less apparent), the gun of smallest calibre will have, with an equal remaining energy, the greatest power of penetration.

The last fact is important since many other considerations tend to diminish rather than increase the calibre of armor-piercing guns; although for the first twenty years of the struggle of gun against armor the opposite idea prevailed. We shall have occasion to revert to this question of calibre when we come to consider the question of resistance of the air to the flight of the projectile.

#### REACTION AGAINST MONSTER GUNS.

16. To-day the reaction against monster guns is general. In France, for instance, after having reached the calibre of 42 centimetres we have gone back to 34 and 32, and we finally think that a calibre of 30 centimetres (12 in.) is adequate for every purpose.

Under existing conditions combat, in which large cannon will be employed, will take place at a distance not exceeding a thousand metres; it is therefore sufficient to have guns capable of penetrating at that distance a thickness of 50 centimetres of steel. Now, a 30-centimetre gun throwing a projectile of 284 kilograms, with an initial velocity of 850 metres, will pierce 104 centimetres of soft iron at the muzzle; even deducting something on account of obliquity and distance, the penetrating power of the gun answers fully to the resistance of a plate of 70 centimetres of steel. The calibre of 30 centimetres is an extreme limit, which it is inexpedient to pass.\*

Many people even hold, and with reason I believe, that this reaction is far from having reached its limit. I shall return to this point later. (§ 50).

17. Hundred-ton guns are difficult to construct, and consequently cost very dear; nevertheless, some excellent ones have been made, and if they were the only ones capable of penetrating armor the question of expense would have to be disregarded.

But it is thought that the disadvantages of these guns have offset their entire value from the moment when, thanks to the increase in initial velocity, smaller guns were found capable of performing the same work.

Difficulty of construction and great expense are not, however, the only, nor even the principal, faults of artillery of too great calibre. Besides being difficult to put in place, to protect, and to handle, they overload the ship considerably by requiring enlargement of all sorts in mountings, turrets, platforms, and machinery for handling.

But their military inferiority is still greater. If cannon can be constructed sufficiently powerful with a weight of say 65 tons, a ship armed with three of these pieces will be incomparably more powerful than another which carried two 100-ton guns. These large pieces depend upon complicated machinery, easy to damage, and whose faulty working is sufficient to disable them. The ship will therefore have one and a half times less chance of being silenced; she will be able to fire volleys of three shots instead of two, and, since smaller cannon are manœuvred more rapidly, she will be able to deliver two or three times the number of effective shots in a

\* A. Croneau, "Cannon, Torpedoes, and Armor." Paris: Masson, 1892.



given time. Besides, if we give to the ship, for instance, carrying two guns of 42 centimetres, a supply of 100 projectiles of 780 kilograms per piece, this weight is equivalent to that of 549 projectiles of 284 kilograms—that is to say, 183 shots for each of the three 30-centimetre guns.

As to the general diminution accruing from the reduction of the accessory machinery, it may be utilized to benefit the ship or employed to increase protection, supplies, or motive power.

In any event, the fighting power of the ship will be much increased, if we succeed in reducing the weight and calibre of the weapon capable of a given penetration.

#### THE EFFICIENCY OF THE GUN AND THE MEANS OF IMPROVING IT.

18. So for a considerable length of time, in proportion as we have been confronted by an increasing thickness of plate, we have not contented ourselves by fighting it merely by an increase in calibre. It was in fact necessary to increase the living force. Now, this could not be done in a given calibre except by increasing the interior pressure, and from the moment that existing cannon had arrived at the limit of their resistance, it became necessary to construct larger ones.

But it was soon perceived that this course had been pursued further than was necessary, for two reasons: First, it was possible to better utilize the power of the powder gas, by making it act for a longer time upon the projectile; secondly, it was possible to increase the resistance of the cannon and thus the maximum pressure. Each of the forward steps, or the two united, lead to the increase of the efficiency of the cannon—that is to say, to the increase of the number of kilogrammetres of living force corresponding to a kilogram of weight of the cannon.

This better utilization of the weight of the metal of which the gun is made has become the principal object of the constructors, and it therefore behoves us to examine the different methods by which this may be obtained.

But, first of all, it is important thoroughly to fix our ideas concerning a notion in which there has often been an unfortunate tendency to see a universal panacea.

19. We have been led to the idea and to the expression for the efficiency by the consideration of machines of every kind. A gun is in fact nothing more than a thermodynamic machine destined to develop and to transport to a distance a certain quantity of living force. If we consider its absolute efficiency—that is to say, the relation of the useful work produced to the energy which was accumulated in the combustible—the powder—it may even be declared one of the most ordinary machines that exist. According to Mr. Longridge, the energy communicated to the projectile would be in fact only about one-tenth of the potential energy of the charge. Eighty-five per cent. of this last would be wasted in the form of heat carried by the gas into the atmosphere, and the remainder is lost in different passive resistances. This recalls the condition of the first steam engines; but it does not appear, unfortunately, that we are on the verge of the construction of condensing cannon.



But the efficiency, thus understood, depends at least as much upon the powder used as upon the cannon. And, so far as concerns this last, the elements upon which we can act have but little effect upon the absolute efficiency. The latter would evidently be improved if, for instance, means were found to close the cannon at the muzzle, as soon as the projectile left it, and in such a way as to retain the gases and utilize them immediately; but as there is every reason to admit that for a long time to come the cannon will remain open in front, we must treat only of less revolutionary considerations.

The only efficiency which is of interest to the constructor, because it measures the degree of utilization of metal and because the means are possessed for acting effectively on it, is therefore that which is measured by the ratio of the living force produced to the weight of the cannon, and if looked at from the standpoint of the constructor of ordnance alone, it would seem to be always especially desirable to make this a maximum.

20. This is not always the case, for the good reason that cannon are not constructed for themselves alone, but must be adapted to the requirements and wishes of those who are to use them. It may happen that it will be well to avoid carrying the efficiency to an extreme, for example, in the case of field artillery, where it is difficult to give the carriage sufficient resistance.

This latter point may also come up, although rarely, in the construction of sea guns. Here we are less embarrassed by the question of the carriage; in fact, we can have fixed mountings, in whose construction every resource of modern mechanism to transform and deaden the shock may be employed. However, it may happen, for example, that in a very long cannon the breech is made heavier than its resistance alone requires, in order that the gun may more readily balance upon its carriage and to diminish the dimensions of the latter. In fact, when a gun is placed in a turret it is necessary, according to the requirements of service, to leave around it a circular zone of constant width. If the dimension of the carriage be decreased the surface of this passage, and consequently also that of the turret, will decrease rapidly. It may thus happen that a slight overweight given to the cannon will produce considerable benefit upon the weight of the turret and its accessories.

Will it be said, in this case, that a decrease in the efficiency of the gun has been a mistake? Assuredly not; for in this case, the ratio which it is important to increase is that of the living force, not to the weight of the cannon alone, but to that of the whole system, cannon, carriage, turret, and accessories.

21. However this may be, the object most often to be attained is to obtain the greatest amount of living force possible for the weight of metal given in the construction of an armor-piercing gun.

Thus the problem of the increase of this kind of material bears two different aspects: The greatest possible increase of the quantity of living force communicated to the projectile by a cannon of a given weight; or the reduction to a minimum of the weight of a cannon producing a given living

force. To do this, we may act either upon the conditions of the charge or upon the piece itself, or even employ both methods at the same time.

In order to increase the living force produced, the old method of throwing larger and larger projectiles has, as I have said, been abandoned. I shall, therefore, say no more about it here. Besides, it is important to note that it has nothing to do with the present problem, which consists in increasing the efficiency. At the time in question they increased the projectile, it is true, but they did so by increasing equally the calibres and weights of the guns themselves.

The efficiency of the latter did not necessarily increase; it merely became what it could.

The methods of procedure at present in favor for producing the greatest amount of living force consist either in increasing the interior pressure by any means whatever, or in improving the powder in such a manner that the interior pressure decreases less rapidly after having reached the maximum, or, in fine, in utilizing for a longer time the expansion of the gases by increasing the distance travelled by the projectile.

As to the reinforcement of the cannon, this can be obtained either by improving the quality of the metal employed, or by adopting a more perfect system of construction.

It is besides evident that these different methods, which it is necessary to study separately, react upon each other; thus, for example, if the condition of stronger fire be imposed upon a gun, it will be necessary to reinforce it by some means.

#### REMAINING LIVING FORCE.

22. It is essential to state that the living force that it is important for the artillerist to see increased is that which remains in the projectile, at the distance where it is to produce its effect, and not that which it possessed at the moment of leaving the cannon. This point is often lost sight of by constructors who have acquired the habit, on account of its greater convenience, of considering principally the initial living force. The latter is easier to determine, without counting the fact that in the other event it would become necessary as a preliminary to come to an understanding upon the "proper fighting distance" at which the remaining energy of the projectile should be measured. But the most stupendous velocity and initial living force will leave the artillerist very much out in the cold if they are immediately lost in flight; for him they are a *means*—a means of obtaining greater energy of impact—not an *end*.

Now it is known that the rate of increase of the resistance of the air is much more rapid than that of the velocity imparted to the projectile; so that, if the latter be already very great, it will be necessary to increase it by enormous proportions in order that it may remain an appreciable benefit at a certain distance from the cannon, and then we are drawn into difficulties out of proportion to the results obtained.

The means of preventing the velocity from decreasing so rapidly, consists in increasing the weight of the projectile while preserving the same calibre, or else by diminishing its calibre, the weight remaining the same.

I am supposing it to be understood that, in all these cases, the most advantageous exterior form has been given—another question in regard to which calculation has thus far been compelled to lower its flag before experience.

#### TRANSVERSE DENSITY AND RELATIVE LENGTH.

23. To increase the weight of a projectile, and to diminish its calibre, amount to the same thing. There are two methods of increasing the weight or a unit of surface of the right section, which I shall call, for the sake of brevity, the transverse density. It is the development of this idea which originally led to the replacement of the spherical bullet by the oblong shell, and then increased successively the length of the latter. And we might also properly call both of these operations the *relative elongation* of the projectile, noting, however, that this expression might apply to a fictitious as well as a real elongation; for example, an increase of the mean density of the projectile, either by making it of a denser metal or by restricting its interior space, would constitute a fictitious elongation.

24. The transverse density of a projectile and its relative length, that is to say, its length expressed in calibres, are two elements of the greatest importance. So it is necessary to keep from confusing them, or at least from confusing their respective influences, as has occasionally been done.

The transverse density plays an important part in exterior ballistics. All the received formulas admit that the resistance of the air is in inverse ratio to it, and that consequently there is a reason that it be as great as possible. It is, at all events, well to remark, in order to avoid too absolute a conception, that this relation which is so simple is verified only upon the condition of rendering the transverse density entirely inappreciable, by multiplying it by an empirical coefficient; and the latter (the coefficient of efficiency of Major Vallier) depends in an unknown manner upon the forms of the projectile, and its determination is as little exact as it is difficult. But however that may be, ballisticians demand for the projectile great transverse density.

The density is the quotient of two monomial functions of the calibre which enter it, one to the third power, the other to the second; it is therefore proportional to the calibre in similar projectiles. After stating this fact it is generally added, "Hence arises the ballistic superiority which projectiles of large calibre possess over those of smaller calibre."

This proposition is absolutely exact. Only in this form it is badly stated, and may lead to an erroneous interpretation. Above I recalled the fact that the reduction of calibre is advantageous to the penetration of the projectile into armor. How, then, can its increase, on the contrary, favor its penetration of air?

In reality, when two projectiles are similar, if the larger preserves the greater velocity, it is not *because* it has the largest calibre, but *in spite* of this circumstance. The true reason of its superiority is that this projectile is at the same time the longer of the two in absolute value. It is, in fact, true that projectiles being supposed similar, their lengths are in proportion to their calibres; but it does not follow that it is a matter of indifference whether we replace the idea of length by that of calibre in our reasoning.

Calibre is a cause of retardation, whereas length is the true cause of acceleration.

This distinction may appear subtle, but it lies at the foundation of things.

Let us call the weight  $\phi$ , the calibre  $c$ , the length  $l$ , and the right section of the projectile  $\omega$ . A and B are two numerical coefficients. The transverse density will be equal to  $\frac{\phi}{\omega}$ ; it may be placed successively under the

form  $\frac{A\omega l}{\omega}$ , or  $A l$ , or finally  $B c$ . But however correct may be these transformations from an algebraic point of view, they are not so physically speaking.  $\frac{P}{\omega}$  and  $A l$  are forms which take into consideration an observed phenomenon;  $B c$  is one which disguises it so far as to alter its nature.

This is a fact analogous to the difference presented by two isomeric chemical components: the constituent elements are the same, but their arrangement is different, and produces in the whole different properties.

25. Considering matters in this way a much more general idea will be obtained of the influence of the dimensions of the projectile.

Instead of saying, "of two projectiles the one most advantageous with regard to translation through the air will be the one with the greatest calibre," let us say, what amounts to the same thing, that the longest will be the most advantageous. The proposition can immediately be put in general form.

If we consider any two projectiles whatever, we shall arrive at the same conclusion by introducing an intermediate projectile having the calibre of one and the length of the other\*; thus the projectile characterized by the symbols  $c$  and  $l + l'$  will act better in the air than the projectile ( $c, l$ ), and this last will offer less resistance than the projectile ( $c + c', l$ ). Summing up the matter, projectile ( $c, l + l'$ ) is superior to projectile ( $c + c', l$ ). Hence we obtain definitely the following enunciation:

If two projectiles of any calibre whatever have the same mean specific gravity, the longer one will best preserve its velocity in air, allowance being made for the influence due to the form of the head.

In particular, if they are similar, or if they have the same calibre and the same ogival form, the resistance opposed by the air will be inversely proportional to their length.

26. In practice these kinds of propositions ought not to be taken in too absolute a manner, many elements, such as length, the form of the ogive and of the fuse, the place of the ring, the form of the base, may come to have an action in a sense inverse to that which the mere consideration of the length would cause to be foreseen.

But, nevertheless, the fact remains that the endeavor should be made to increase the length, or at least the fictitious length, of the projectile.

The restriction relative to the fictitious length is taken for the reason that too great an increase of the real length presents two grave inconveni-

\*In order to speak strictly, it is necessary to suppose the projectiles cylindrical, in order to eliminate the influence of the ogival force, but I suppose this detail to be neglected.

ences. In the first place, the tendency to tumble during flight goes on increasing and necessitates a very rapid rotation; pushed too far, the latter causes the stripping of the ring, hastens the wear of the gun, and may beside cause the production of too high pressures.

On the other hand, a projectile that is too long, fired against a plate, has a greater tendency to break up at impact without going through.

It is always better, then, if possible, to increase the transverse density by employing a material of greater specific weight or by diminishing the interior space rather than by giving greater length to the projectile; this is what I call increasing the fictitious length.

Even in this a limit soon appears, as we shall see when we come to the question of pressure.

(*To be continued.*)

### BALLOON PHOTOGRAMMETRY.\*

BY PROF. R. MEADE BACHE, U. S. COAST AND GEODETIC SURVEY.

*From the American Journal of Photography.*

(By permission.)

**B**ALLOON photogrammetry has been practiced to some extent ever since the invention of the photographic dry plate. This method, however, has belonged rather to the sphere of reconnoissance than to that of surveying. When some prominent objects appear on the landscape, whose geographical relations to one another are known, the balloon photographic product may be of considerable value, if too large a circle has not been included by the camera; and this method indicated, if the desirable conditions are strictly fulfilled, may be utilized to advantage if the resulting map is not required to be of rigid accuracy. When, however, such objects are very remote from one another, even when their geographical positions are known, the spherical aberration resulting from employing a large aperture of object-glass makes a product which cannot be regarded as of high value, one which cannot properly be dignified with the name of survey in the restricted sense of the term, and to which we should prefer to apply the name of reconnoissance. Without adjusted height for the camera, without near objects of known geographical relations to one another, to obtain orientation for the results, without precise regulation of the angular aperture of the object-glass of the camera, nothing can be produced by balloon photographic process that, in the restricted sense noted, merits the name of survey.

It is on account of my perception of this low estate of balloon photogrammetry that my attention is especially drawn to devising a method of applying the art upon true principles. By my method the balloon must be captive, not free, and being captive it may be made quite small, easily managed, and inexpensive, thus rendering its employment practicable for ordi-

\*Read before the American Philosophical Society. (See December JOURNAL.)

nary use, especially as, according to the plan sometimes adopted in the case of the military captive balloon (to the consideration of which we shall presently come), the gas requisite for inflating the balloon can readily be carried under high pressure in metallic cylinders.

The traverse line of land surveying is merely a zigzag course, consisting of stations, the angle between each successive three of which, and distance between each successive two, is measured. From these stations details of the *terrene* are generally procured. To enable a traverse line to form a portion of a general survey, there must be means adopted to place at least its initial and terminal points in relation to that survey, whereby all intermediate points fall into due relation with it.

This premised, I will now describe how my plan for introducing precision into balloon photogrammetry could be applied in various useful ways for delineations of portions of the earth's surface.

The appliances needed for carrying out the plan are a small spherical balloon capable of supporting a light photographic apparatus, swung in gimbals, and protected from injury in descent by a thin encircling cylinder of metal or of wood. A zone of cord would pass horizontally around the balloon, to which would be attached four equidistant guys of the size of codfish lines. A broad colored stripe would pass vertically around the balloon. From below the balloon would depend reophores enclosed in a graduated cord, the graduation serving the purpose of adjusting the balloon to any given height above the earth. The reophores would be electro-magnetically connected with the shutter of the camera, actuated from the ground by a small, but strong, galvanic battery.

The balloon, being inflated, would be compelled, by means of the four equatorially fastened guys, to assume a position regulated as to height by the graduated cord. This height will have been previously determined upon with reference to the scale of the map that may be desired, the focus of the camera having also been adjusted with reference to the contemplated height of the instrument above the earth. The position of the balloon would be over the middle of a given link of a traverse line, the orientation of the camera being secured by causing the vertical stripe on the balloon to range along the given link of the traverse line. Two disks, made of hoops covered with white cotton cloth, one of which should be larger than the other, would give on the photograph, points representing the termini of the link corresponding to those on the ground, and the direction in which the link, as a portion of the traverse line, is lying.

A very low grade of accuracy could be obtained by the balloon photogrammetrical process by the method of omitting all angular and linear measurements on the ground, and letting the balloon camera, placed in a generalized position with reference to the parts of a traverse line, accomplish the whole work of determining the angles and directions of the parts of the line successively submitted to its operation, as well as of delineating what it must perforce include by the photographic process in the representation of the details of the subjacent *terrene*. In this method the end link of a given section of the line would have to be duplicated in the advancing survey of line, so that the relations with one another of all parts of the line should be



maintained. If, additionally, the azimuth of one of the links of the line were obtained, it would communicate azimuth to all the other links. But this method can, at best, be recommended for nothing beyond the requirements of reconnoissance.

The photographing of a link of a traverse line in the precise manner first described involves, of course, the necessity that the balloon and each of the two stations representing the link over the middle of which it is floating, should be intervisible. A similar condition, as between the two stations as viewed on the ground, is indispensable. It is evident, however, that if there are trees or other obstructions on the ground, the stations might be intervisible below, and yet that each might not be intervisible with the balloon. Consequently, as not only these conditions but the condition of ample space for the management of the guys must be fulfilled, precise operations with the balloon imply the existence of open ground, or ground substantially free from obstructions to sight.

In proportion as the balloon is allowed to attain a greater and greater height, so as to include more and more of the earth's surface, the scale of the resultant map would become smaller and smaller, and the apparatus more and more unmanageable, because at a greater height the guys cannot be maintained at the angles requisite to control its exact position. Therefore, it will in practice probably be found that heights of from three hundred and fifty to five hundred feet will be those most convenient for surveying by this method.

One gain made by elevation is more than counterbalanced by the loss of the clearness of delineation that belongs to a large scale. It is evident that, at moderate heights, the photographic projection of an abrupt rise of ground or other object, as, for instance, a house, on the plane of the photograph is at a greater distance by scale from the vertical passing through the balloon than it should be as related to nature, but that, as the height of the balloon above the earth increases, this error proportionately decreases. Therefore, for the moderate elevation that must be adopted for the balloon in order to manage it, we must, with broken surface, accept greater error in delineation than would attach to the same surface if greater elevation of the balloon were permissible. But we should be reconciled to this fact from the consideration that, even were it possible to manage the balloon at the height which would virtually eliminate the error of projection mentioned, the scale of the resulting map would be so small as to approach in character the results of a reconnoissance. Another circumstance should reconcile us to the insuperable fact mentioned, and that is that there are thousands of square miles in our country where, from the very fact that the surface is essentially level, the optical difficulty attaching to moderate elevation for the balloon would not exist.

Such a survey, by balloon photogrammetry, as that described could be very easily plotted by final process of photographic printing. In consequence of the fact that the balloon would be kept at a fixed height throughout a given survey, the scale of the links of the traverse line would be established through the photographic presentment of the length of those links. The scale of those links may also be fixed by the measurement of them on



the ground. So the photographic scale and the other scale may be made the same. The traverse line having finally been laid down on helios paper, before the paper is sensitized, the paper would then be sensitized, and the photographic plates representing the links of the traverse line would be simultaneously adjusted upon it along the traverse line as plotted, one scale, as derived from adjusting the balloon at a certain height, and the other scale, virtually the same, as derived from linear measurement along the ground, being made to accommodate themselves graphically to each other, thus eliminating error in the resultant map. This resultant map, if the picture of a plane surface, would have but one defect, that of exhibiting minute triangles of blank space where the photographic plates, cut off so as to fit along the links of the plotted traverse line, would necessarily not fill out entirely the delineation of the ground at those points, although otherwise perfecting it elsewhere, from the fact that they would form with one another a continuous series.

The captive balloon, if used only on days fit for ordinary field work, would occupy a position of almost stable equilibrium, if its power of flotation were sufficient, not only to support the photographic apparatus, but to strain upward upon the controlling guys, because the attachment of the guys would be made to the equator of the balloon, and the weight of the dependent apparatus would be close to its periphery, and therefore to the centre of the spherical figure of the balloon. In addition, for the purpose of increasing the stability of the balloon at the critical moment of taking a photograph, the operator would steady it with a gentle draught upon the dependent cord containing the reophores, at the precise point of time when he makes the electrical contact with the shutter of the camera.

I here conclude the description of that one of my proposed additions to the art of photogrammetry which relates to precision of results obtainable from it for a continuous line of survey, and invite your attention for a moment to a method I suggest of using a similar captive balloon in a manner which would be useful in military operations. It need hardly be said that, whether captive or not, balloons have heretofore been used at great disadvantage in military operations, unless we except the use made of them for escape, with indirect reference to those operations during the recent siege of Paris. If the free *aéronautic* balloon passes over the enemy at such a distance as to make useful what can be observed from it, the glimpse is but transient, while its nearness and immense volume place it in great danger. If, on the other hand, a captive *aéronautic* balloon be used for military observation, it must ascend far from the enemy, to a height which measurably neutralizes the accuracy of the information sought.

The use for military purposes of a modification of the small spherical captive balloon which I have described would be conditioned solely upon the circumstance that the wind should be blowing towards the enemy's lines. The only change in it from the one described, that would be entailed by its new purpose, would be that it should be mounted with a simple network similar to that which is used on the kite, and to which the string for flying it, fastened similarly to the way in which it is fixed on the kite, should be attached. This string, with which the balloon would be flown like a tail-

less kite, would contain ordinary filigree reophores, through whose instrumentality the photographic shutter of the camera would be controlled by the operator. Lying several hundred yards away, or even a mile or two, if desirable, outside of an enemy's lines of circumvallation, or line of battle, with the wind blowing in his direction, the balloon could be sent up with ballast proportioned to the general elevation intended for its soaring over his position. I have said "general elevation," because change of volume in the balloon, in accordance with the change of temperature, or increased weight on it, from an accession of moisture, preclude the possibility of calculating upon obtaining precise predetermined elevation for the balloon. The weight of the string for the length to be paid out to the contemplated distance would of course enter into the amount of ballast needed to secure an approximately special elevation at a special distance. The distance to the enemy's position being known, and the vertical angle being taken to the balloon from its point of departure, where it is approximately delivered at its destination, the exact remaining length of string, with allowance for sagging, necessary to pay out so as to cause the balloon fairly to dominate the enemy's military works or line of battle, would at once be known by a simple computation, or could be taken from a table of angles and distances. This operation being completely performed at several points along the opposing military lines, a series of pictures, at varying distances from front to rear, and from right to left of the enemy's position could be secured by means of the electro-magnetic attachment to the shutters of the photographic cameras, each individual one of which could take a number of pictures without a replenishment of plates. It is evident that such a use of the balloon and the photographic camera would have proved greatly advantageous to either side in such modern sieges as those of Sebastopol, Richmond, and Paris.

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### THE GERMAN MANŒUVRES.

*From the Army and Navy Gazette.*

THE Military Correspondent of the *Times* who attended the German manœuvres sums up the results and the system of preparation as follows:—"Between the 3d and 15th of September nearly 100,000 men, with 15,000 horses and 350 guns, assembled near Metz and Strasburg, and for the space of ten working days the Imperial Commander-in-Chief, and his first military adviser, the Chief of the General Staff, thoroughly tested the efficiency of the four frontier Army Corps. Similar gatherings take place annually in one province or another of the Empire, and once in every four years each of the 20 German Army Corps is inspected by the supreme authorities. These great concentrations, however imposing as they are, form no more than incidents in the annual training of the troops. They are merely the conclusion of a long series of practical exercises; and as the number employed constitute little more than a detachment of the army, so the period of manœuvre represents but a small portion of the time allotted to field duties throughout the year.

"One of the distinguishing marks of the German army is that everything connected with it has been reduced to an exact system. There are few who are unfamiliar with the general principles of its organization, with its simplicity, its capacity for rapid expansion, and its adaptability to the needs of war. Here system reigns supreme. To place its enormous force on a war footing is the work of the mobilization staff; and their arrangements, worked out down to the minutest detail, have already proved adequate to any sudden emergency. The concentration of the masses on any particular theatre of war—those complex movements which military writers call 'the strategical deployment'—proved in 1870 as amenable to system and forethought as the work of mobilization.

"The conclusions at which the German military authorities have arrived it will be my endeavor to make clear. Some of these, especially as regards tactics, are diametrically opposed to those in vogue in 1870. Others show little variation from the procedure as then established, but even here there has been improvement. Thus the arrangements for mobilization and concentration are more perfect, although, in a general sense, they have undergone little change. The same may be said of the training of the troops. This, as we have seen, fully proved its efficacy in 1870, and it has not been found advisable to alter, in the very smallest degree, the basis on which it rests.

"This basis, to which the high average of efficiency in every branch of the service is mainly due, is exactly identical with that which underlies the arrangements for mobilization and concentration. It consists, in a word, of a system thoroughly understood and universally applied.

"No description of this system would be complete without allusion to those charged with its administration. Regulations, however judicious, are useless unless carried out in the spirit in which they are framed. In a great army, scattered over a great empire, it would be impossible to insure uniformity or to prevent lapses without the most careful supervision; but I shall postpone further reference to the admirable work done in this direction until I come to speak of the German officers and the general staff.

"The system is regular, comprehensive, and progressive. Every officer and every soldier can tell you in January exactly the amount of practical work he will have gone through by December. Every one is included, from the commander of 40,000 men down to the private of Landwehr. All come at frequent intervals under the eye of a superior; and so many days' training under their immediate leader are allotted in turn to every unit, beginning with the company in spring and ending with the army corps in autumn.

"The exercises, if we put aside the ordinary rifle practice, consist mainly in tactical exercises over broken ground. The companies, each of which contains a large number of recruits, the annual contingent of conscripts, have obtained enough proficiency to work in combination with others by the end of April. The battalion then becomes the unit of manœuvre, replaced at the end of June by the regiment, and in July by the brigade. This portion of the work is done in the vicinity of the garrisons, but not always in the near vicinity, for in order to practice the troops in

marching and to find new ground the troops have to move out to 10 and sometimes 15 miles from quarters.

"About the middle of August the manœuvres proper commence, and these are carried out in the territorial district—it may be several marches from the garrisons—and the troops are either billeted in the villages, continually shifting their quarters, or bivouac in the fields. This phase of training is carried out by the division generals and their staff, and the three arms are invariably worked together, but here again is the usual progressive procedure observed, one regiment, with a proportion of cavalry and guns, manœuvring against another, then brigade against brigade, and, finally—if it is not the turn of the corps to be inspected by the Emperor—under the superintendence of the corps commander, division against division. The imperial manœuvres generally take the form of one corps manœuvring against another for three or four successive days. *Mutatis mutandis*, the same system is applied to cavalry, artillery, and engineers. Now, when we bear in mind that the principal work of this long period of training is given to tactical exercises, it is evident that the German officer and the German soldier takes part in what we designate as field days several days a week throughout the summer of every year—in a word, he is incessantly engaged in practically learning the duties that fall to his lot in war. When we remember that this system is applied to the whole army without exception, the high standard of efficiency manifest in every garrison of the Empire ceases to be a matter for surprise. I may add that field-firing—that is, tactical exercise on the rifle ranges—constitutes an important part of the system, and the German soldier fires 60 rounds annually in these practices. It may, moreover, be interesting to note that while training for battle is the principal object, close-order drill is by no means neglected; even the ceremonial of the march-past often closes a long field-day. By this means it is believed that the slackness which is produced by the loose methods of modern fighting is best counteracted, and the habit of instant obedience, of surrendering will and muscle to the fiat of a superior, is most readily restored. With such habits made instinctive, discipline, even under the stress of modern fire, may be maintained; and to further the desired end, the German close-order drill exacts unremitting attention, the utmost precision of movement, and the most scrupulous conformity with the regulations from all concerned. The change from a battalion attacking a position to the same battalion moving on the parade ground is almost startling. In the first there is much apparent disorder, every individual has a certain latitude allowed him, the companies move independently in many varying formations, and in certain phases the men appear to be crowded in confused masses, or to be streaming over the country like a pack of hounds. Perhaps 20 minutes later you see the same battalion moving like one man, with a steadiness which I have never seen equalled, and handling their arms in absolutely perfect time.

"Movements in close order are, moreover, of the utmost importance in the preliminary formations for the attack, especially when masses of troops are concerned. The German regimental and brigade drill has a direct connection with war training, and, so far as I have seen, it is usually confined

to the formation and manœuvres of the successive lines in which the troops are drawn up, whenever possible, preparatory to moving against an enemy in position, the movements consisting in forming these lines at various angles to the original alignment with a varying number of battalions or companies in each, and occupying a varying extent of front. But even in these more practical manœuvres, the same precision, the same exact attention to detail, to dressing, interval, and distance are exacted as during the march-past; the men come to the slope and order with the same uniformity as in the manual, whilst the officers, whether halted or in motion, set the example of that uncompromising rigidity which marks the attitude of the German soldier at 'attention.' As did the battalions of Frederick the Great, the German Infantry of to-day may come to owe much to the perfection of their close-order drill. *The formations of the parade ground may never be employed in action, but they are undoubtedly the best school of discipline."*

There are not many picturesque elements about the columns that go pouring out of every garrison to the rendezvous. The German uniforms, with the exception of those of the Hussars, are sombre in the extreme. Dark blue for the infantry, the artillery, the Army Service Corps, or train, as it is called—dark blue, with dark grey trousers, is almost universal. Only the dragoon—the ubiquitous dragoon—breaks the sameness with his light blue tunic. Even the Uhlans, the famous heavy cavalry of Germany, have only their glittering shoulder scales to relieve the eye. There is only one bit of bright color about the infantry man or the dragoon, and that is the helmet, of "universal pattern," for all the time that is spared from cleaning rifle and sabre is given to the heavy brass ornaments of the *pickelhaube*. Very conspicuous in bright sunshine are these polished spikes, and betray the approach of the troops as readily as if they were marching with fixed bayonets. In war, however, the tell-tale head-dress is to be hidden in a cover of drab cloth.

Still, picturesque or not, the German soldier has many characteristics which are worth noticing, and we will look at each arm in succession, giving preference to the infantry, which, in the German army, as "the queen of battles," takes its proper place on the right of the line. Remembering their achievements in Austria and France, people are inclined to picture the German linesmen as big, broad shouldered, bearded men, something of the same stamp as the men we see returning from our own colonial wars or Indian garrisons. Such is the popular idea. But it is very far from being a true one. The fact is that even with a proportion of reserve men in the ranks, and at the manœuvres each company of infantry (four companies go to a batn.) had 25 or more, the men look very young, and in height they are a good deal below the average of an English batn. What their age is we know. They are none of them below 20; none of them, except a few sergeants, more than 24. They are generally broad-shouldered, and their constant gymnastic work makes them deep-chested, but, so far as regards physique, our own recruits compare most favorably. There is only one point in which the German soldier seems to me superior, on an average, to our own men, and this may possibly be due to the fact that his trousers are

generally baggy and the skirts of his tunic—to say the least—voluminous. But he certainly looks more sturdy “on his pins” than many of our own recruits, and more heavily built below the waist. It is possible that this may account for his good marching powers under the weight he carries. As he stands, on parade, with his cowhide knapsack, his coat and *tente d’abri* folded over it, his pouches, intrenching tool, rifle, bayonet, and clothing, the German soldier carries well over 60 lbs. But, in order that there may be no mistake, I may say that his knapsack, with all its paraphernalia, great coat, tent, and mess-tin, weighs only 24 lbs., and it is hard to believe that our own men, young as they are, could not carry this extra burden if they had the necessary practice.

A peculiarity about the German infantry soldier is his boots. They are rough, square-toed Wellingtons, coming well up the calf, into which the trousers are tucked. It is possible that they may be serviceable enough, with their heavily-nailed soles, and they certainly prevent mud working in between the boot and the trouser, as a gaiter does not; but in wet weather they must be difficult to pull off, and there can be but little ventilation. However, the German soldier is well used to his uncouth footgear, which he wears with greased rags instead of woollen socks, and it certainly does not prevent him from getting over the ground at a tremendous pace. Over and over again I timed the columns, and they were doing very nearly four miles an hour, the infantry in some instances actually running away from the artillery following them. This rate, which of course does not include halts, they are able to maintain throughout. I have seen them, on a hot day, white with dust, coming along after a trudge of 18 and 20 miles at the same swinging step, with the ranks well closed up and without any “tailing” whatever. The marching formation along the road is invariably in column of “groups,” on a front of four or sometimes five men; across country the formation is generally column of sections (“company column”) at deploying interval.

I may add that the German soldier carries his ammunition in three pouches, two small ones in front and a larger expanse pouch behind, and that these pouches are more practical than our own. He is supplied with 150 rounds for his Mannlicher rifle, the magazine holding five cartridges. In peace the men wear long sword bayonets, which are changed on mobilization for “knife” bayonets only ten inches in length. An intrenching tool, spade or combined pick-and-hatchet, is carried by every file; it is attached to the waistbelt and strapped to the bayonet. The rifle is sighted up to 2150 yards, and the fixed sight is used up to 280 yards. The trajectory, I believe, is not so flat as that of the Lee-Metford, but the German rifle is a pound or so lighter. There are very few old non-commissioned officers in the batns. Great inducements are offered to men to reEngage, but very few are retained after 12 years, and, as far as I could see, by far the larger proportion, including sergeants, have more than three years’ service, that is, they are just of the same standing as those men who have been longest with the colors. This description of the infantry applies to the troops of the four army corps I saw whilst in Germany, and I am informed, on good authority, that it applies equally well to at least four others. Of course there are regiments and possibly whole divisions in other districts of the



Empire which are exceptional as far as regards physique, but the men of the army corps drawn from the districts on either bank of the Rhine are such as I describe. It will be well to recall, however, before jumping to conclusions, the difference between the German organization and our own. We have a small army, and service is voluntary. Germany can put 2,000,000 men into the field, and impresses every able-bodied man. We are able to reject men who do not reach a certain height; but, in order to maintain her enormous numbers, Germany imposes a much lower standard (5 ft. 1½ in. against 5 ft. 3 in.), and it is not impossible that had she to provide no more than 210,000 regulars like England, her batns. would overtop our own. But, be this as it may, our own infantry, even at home, are, man for man, physically superior to the German line. However, the important question is, not which army is the heavier and more muscular, but whether our superior raw material is as well finished as the German.

Between the English and German cavalry, in two respects at least, there can be no comparison. Both in physique and horsemanship our troopers are infinitely superior; and, so far as these points go, the English cavalry is far above the very best the Continent can produce, whilst, as light cavalry, our Indian horsemen have no rivals in either Germany or France. The young German soldiers, although the riding has much improved of late years, scarcely look at ease in their saddles, and, if it were not for the docility of their horses, would be of little use across country. All regiments carry hollow steel lances, swords, and magazine carbines, and certain ranks have revolvers. The lances, with their gay pennants, are the only showy gear, with the exception of the helmets, about the Dragoons and Uhlans. The long boots are clumsily made and innocent of polish, and the tunics have none of the smart cut we are accustomed to associate with the trooper. The horses, too, do not at first attract the same admiration as the well-groomed and well-fed horses of our own cavalry. But, comparatively diminutive as they are, and looking light for their riders, they show a lot of breeding; and, reduced as they are by the constant work of the summer to little more than skin, bone, and muscle, they look thoroughly fit for the field. But the chief thing that strikes one is their extreme quietness in the ranks. Ridden on a lighter bit than ours and by less skillful horsemen, the way they "lock up" along the road is extraordinary. Over and over again I have seen the heads of the half-sections overlapping the hind quarters in front, and this the horses do naturally without any urging on the part of the men. In fact, they are perfectly broken, and just as well drilled as their masters. In one other respect they partake of the characteristics of their riders. They are as far removed from the popular idea of the "war-horse" as the men are unlike the gay hussar or dashing light-infantryman of romance. Neither Uhlan nor linesman, cuirassier nor rifleman, looks as if he came of a fighting race. Stolid, patient, and good-tempered, he is a man of peace all over, despite his martial trappings; and one seldom sees in the ranks a face which bears the stamp of the "dare-devil" spirit, troublesome in peace but worth much in war. That zest for fighting for its own sake which marks the Celt, the love of adventure which is preëminently Anglo-Danish, cannot exist beneath his placid exterior, and yet, though his natural



bent may be in other directions, one cannot help feeling that the discipline must come instinctively to him. He is not bred to self-dependence, he has much sentiment, and little enthusiasm; but he can obey, follow, and endure. Like those of the cavalry, the horses of the artillery look too light for the work they have to do, especially when compared with our own; but they are well bred, and, despite dusty roads and heavy soil, look in as hard condition at the end of the manœuvres as at the beginning. Here, again, there is an absence of polish and glitter, and the harness, old and patched, but clean and serviceable, looks more workmanlike than smart. But in this arm, too, the way in which the big columns of six or eight batteries lock up on the march, or move as one unit over the fields, shows the excellent training of man and horse.

#### CAVALRY.

I have pointed out that the individual German horsemen are perfectly trained in this important duty of collecting information, and that the combination of the regiments and squadrons with the other arms is all that can be desired. Lacking every element which attracts the eye, they have acquired so high a standard of practical efficiency that their shortcomings in appearance are very soon forgotten. Nor are these shortcomings of much account. Bits, spurs and scabbards, lack the polish they would receive in barracks; but they are clean for all that, and so much is demanded from the troopers at the manœuvres that it would be difficult to attain the smartness of a parade turn-out. It is, therefore, very wisely ordained that at the manœuvres the ordinary regulations shall be suspended, and the uniform acquiescence in this rule saves officers and men a vast deal of unnecessary trouble, although the result may offend the votary of pipe-clay and burnished steel. At the same time, if such a personage had been present in Alsace I am convinced that he would soon have realized that smartness in manœuvre does more than compensate for the comparative unsightliness of the individual. I saw 38 squadrons, or  $9\frac{1}{2}$  regiments, each rather over 400 strong, at one time or another; and while some benefitted by more dashing leading, there was a striking similarity in the readiness with which both men and horses responded to word or signal. Every single regiment, whether in brigade or isolated, moved with almost equal rapidity and precision; and it was very soon evident that the German cavalry has thoroughly mastered the art of manœuvring in mass with order and regularity. And this order and regularity, difficult of attainment, neutralizes the more showy qualities of superior physique in the man and higher mettle in the horse. Wellington, speaking of his Peninsular Army, wrote as follows:—"I considered our cavalry so inferior to that of the French—although I consider one squadron a match for two French squadrons—that I should not have liked to see four British squadrons opposed to four French; and as the numbers increased, and order of course became more necessary, I was unwilling to risk our cavalry without having a greater superiority of number. \* \* \* In all great movements of our cavalry they get into confusion, the horses are jaded before the moment of action arrives, and it becomes impossible for any man to produce the great effect with the cavalry of which it is capable."

The German cavalry owe their precision of movement to two causes—

first, to their constant practice; and, secondly, to the fact that, the peace establishment being greater than that for war, all horses under six years of age, on the regiments taking the field, are left at the depot. Moreover every horse has two years' riding school before he is admitted into the ranks. This system, combined with the thorough instruction imparted by the squadron leaders, surmounts the difficulty of turning short service soldiers into efficient cavalry, and produces an evenness and rapidity of manœuvre which would otherwise be impossible.

I have already mentioned that the German horses show plenty of bone and breeding, and, notwithstanding the attention paid to precision, celerity is by no means sacrificed; the gait, at the trot or gallop, is no slower than in the English service. In the charge itself, especially against infantry, the accurate dressing of the lines, so conspicuous in manœuvre, was necessarily lost. Impossibilities are not to be expected, even from cavalry so thoroughly trained as the German; and when horses are put to their utmost speed some irregularities are sure to occur. But, on the whole, the front of attack was sufficiently well preserved to insure an immense amount of momentum being thrown into the shock; and, so far as I observed, there was always the closest combination between the line which met the enemy full in face and those employed either in support or on the flanks. Even when long distances had to be covered at speed, the training of the horses enabled the commanders to keep their squadrons well in hand and to maintain intervals and distances with admirable exactness; whilst the readiness with which the regiments manœuvred enabled their leaders to profit by the accidents of the ground and to utilize opportunities for surprise. In attacking cavalry the first line was always much the stronger; against artillery in action I saw one attack made by a regiment with two squadrons in extended order, riding straight for the guns, and with the remainder in support on the left flank. The batteries were not working in close connection with their escort, and although the squadron attached for the purpose intervened in the fight just as the attack reached the guns, it was on the wrong flank, and the artillery must have suffered. Against infantry the attacks were made in two or three lines, and here the cavalry broke into a gallop directly they came under fire. Perhaps the most striking point about the action of the cavalry was its audacity in attack. Every opportunity was seized, and this was rendered possible by the way in which the ground was utilized, single regiments finding cover close in rear of the firing line, and also by the seemingly reckless way in which the squadrons dashed across the fire-swept zone. There was no hesitation in facing either the magazine rifle or deployed batteries; and it is probable that in actual war heavy and useless losses would have been incurred. However, the spirit which dictates such enterprise may be sound. Cavalry, in order to pave the way to success or to avert disaster, may be called upon to sacrifice itself by charging unbroken infantry or strong lines of guns, and it is well, in the first place, to accustom both men and horses to face a rolling front of fire. Secondly, a certain amount of recklessness is inseparable from good cavalry leading, and its opportunities are so few and fleeting that a commander who waits to balance chances is sure to lose them. It is to foster the spirit of audacity, to encourage the

belief of the men in the prowess of their own arm, that so much is demanded from the German cavalry. I am perfectly certain, when the directors of the manœuvres distribute praise and blame, that rashness is much less severely criticised than over-caution, and that the one fault which is never forgiven is indecision. It would be unfair, however, not to add that instances where bodies of cavalry were used without reasonable prospect of success were few in the extreme; and this, no doubt, is due to constant practice in combined tactics. It is only by a thorough acquaintance with the other arms, a knowledge of their formations, of their difficulties as regards ground, and an instinctive appreciation of the moment when they are the weakest, that opportunities for surprise can be detected, and such close and effective co-operation as I invariably observed at the manœuvres can be insured. So essential are these qualities in action, and so impossible of attainment without practice, and practice in conjunction with the other arms over unknown ground, that on this score alone it is impossible to deny the absolute necessity, in order to maintain cavalry in a thorough state of efficiency, of annual manœuvres. I may conclude by remarking that whilst in dash, in rapidity, in skillful leading, and in precision of movement the German cavalry is a model, the experience of the past does not altogether justify its armament. "The nation," says Wendell Holmes, "that shortens its weapons extends its frontiers." The German cavalry, disregarding the warning, has abandoned the sabre in favor of the lance. Every one of her 93 regiments is armed with the long weapon, and it is carried by both ranks, not, as with us, by the front rank only. That its moral effect may be greater than that of the sabre we may admit; and it will be doubtless more effective against infantry which has been overridden or has dissolved into a mass of fugitives. But, notwithstanding certain victories of the Prussian Uhlans over the Austrian cavalry in 1866, the disadvantages of the lance, when two bodies come to close quarters and fight it out hand-to-hand, are sufficiently apparent. However, it is a question whether cavalry combats are even actually decided by hand-to-hand fighting along the front; and the Germans rely rather on their skill in manœuvring, that is, on bringing closed bodies to charge down upon the flank of the *mêlée*, than on the skill at arms of the individual trooper. Our own system, on the other hand, may be expected to produce the same moral effect, and insures at the same time superior physical power at close quarters.

#### ARTILLERY.

I was not surprised to find the German artillery slower than our own. So far as my experience goes, the foreigner everywhere lacks the dash and smartness which characterizes our own Royal Regiment. I do not intend to imply that rapidity in coming into action is a sign of efficiency. The deliberation of the Germans is far preferable to undue haste; but in getting out of action, in limbering up and withdrawing out of range or changing position, in a word, in all movements, they by no means reach the English standard. On several occasions, when speed was of importance, I timed brigade divisions limbering up, and the operation was very seldom concluded under two-and-a-half minutes. I once saw three batteries, in action

against artillery at a range of 3500 yards, suddenly ordered to retire. Three minutes elapsed before the guns got under way, and during that time the opposing batteries put in from 50 to 60 shells. The non-commissioned officers in charge of the limbers were certainly soundly rated for their slowness; but it was not an exceptional case, and the ground was eminently favorable. It is to be remembered, however, that the German horses are by no means so powerful as our own, the drivers less experienced, and pole draught possibly less handy than shaft.

Putting mobility aside, the German artillery merits the highest praise. It was always admirably handled by its own leaders. Save on one occasion it always worked in close combination with the other arms, and the failure then was due to the officer commanding the whole force. With this one exception the batteries were always at the right place at the right time. The infantry were never left unaided. Guns advanced under the hottest fire to take their part in the decisive attack, dashing to close range if necessary, and the umpires permitted such audacity without demur. Like its sister arms the German artillery has no hesitation in facing heavy losses. The splendid results of such tactics in 1870, the vast preponderance of physical and moral superiority which they secured in so many battles, influence the gunners of to-day; and in any future war—if peace practice goes for anything—the most gallant achievements of the past will most certainly be repeated. Inculcated with such fearlessness, the artillery officers show no bigoted prejudice in favor of cover. Their chief aim is to do as much damage as possible, and therefore the first thing they look for in a position is a clear field of fire. Immunity from loss is a secondary consideration, and it can to a certain degree be secured by bringing a large number of batteries into action simultaneously. The guns, then, approach their first position as much as possible under cover; and after the battery commanders have ascertained the section of the line they are to occupy and made certain of the target, the whole move forward and commence firing. If a clear field of fire is not to be secured, there is no hesitation in placing guns, limbers, and teams in the open; but at the manœuvres the undulating ridges favored positions on the reverse slope, just in rear of the crest, and of this advantage was always taken. The bright clear atmosphere and the absence of heather, hedges, and dark woods made observation far easier than in England, with its landscapes of more varied coloring and its misty horizons. Still I saw favorable backgrounds utilized; and the positions of particular batteries were often for a long time difficult to ascertain. As regards points of detail, I noticed that distribution of fire, when the number of batteries on either side was equal, was generally ordered. No portion of the enemy's line of guns was left unmolested. But concentration was always aimed at. Where one side was numerically superior, this was easily effected. Where no inequality existed, the fire of several batteries was "switched" from time to time on to a fraction of the enemy. I never heard instructions issued for the use of the high-explosive shells, 150 of which are carried into action by each battery, but I cannot say that this was not done. There seems to be no objection in the German service to distributing batteries in groups, often at wide intervals; and on several occasions

I noticed how such tactics exposed the enemy to oblique and even enfilading, as well as direct, fire. Limbers and teams were, as a rule, kept close to the line of guns, often in columns just in rear of the flank of the battery, and sometimes beyond the flank altogether. As the choice of their position is left, I think, entirely to the battery commanders, there is much variety; but the power of changing position rapidly seems the main idea.

## Military Notes.

### THE PROBLEM OF MOUNTED INFANTRY SOLVED BY CYCLISTS.

IN the last few weeks the *Revue du Cercle Militaire* has been publishing a series of articles on "Le Problème de l'Infanterie montée résolu par l'emploi de la Bicyclette." The writer shows that in future warfare little reliance can be placed on cavalry reconnaissances when once contact has been made with the enemy, since mounted men would be exposed to the fire of small bodies of infantry well under cover, whose numbers and position would be quite indeterminable. The cavalry scouts could therefore procure no reliable information, and would as likely as not exaggerate the numbers of their opponents, and almost certainly fail to discover their position. With the exceptional facilities now possessed by infantry for concealing their disposition and numbers, the only possible way to keep touch with the enemy is to adopt as far as practicable the policy of seeing without being seen; hence the duty must be entrusted to infantry of some sort. The disadvantages of mounted infantry are notorious, and even if they could be surmounted there would still remain the question of the disposal of the horses, whose presence in many cases would act detrimentally to the attainment of the object for which the men were sent forward. Apart, however, from the necessity for screening one's own movements and obtaining information as to the enemy's, there are a large number of special and valuable services which might be performed by mounted infantry in seizing and holding important positions, making sudden and unexpected attacks on the enemy's flanks or communications, etc.

The great desiderata for mounted infantry are—(1) That it should possess sufficient speed and staying power to execute two, three, or even four ordinary marches without excessive fatigue. (2) That it should be able to go anywhere, along the roads, or across country. (3) That it should be as readily able to shelter itself from observation as ordinary infantry. It is evident that infantry mounted either on horses or on special wagons could only exceptionally conform to some of these requirements, but the writer suggests they might all be fulfilled by cyclists. The ordinary safety bicycle is, of course, out of the question, for, though a good steed on the high road, it is an awkward beast with which to negotiate a ditch or to travel with across a ploughed field. If the bicycle is to be used, it must be easily portable and of sufficient lightness not to interfere with the free movement of its owner. The type of machine which he considers in every way suitable for the purpose is the Noel cycle. This machine has a front driving wheel of 22 inches, and a rear wheel averaging from 10 to 14 inches; it is, of course, geared and driven on a plan similar to the crypto

gear. The back bone has a hinge about half way between the two wheels, which allows of the hind wheel folding over the front one; height is given to the saddle by a stout C-spring, hinged on the back bone a few inches from the upright neck, which carries the handle bar; this C-spring, the upright, and handle bars fold over the front wheel. The whole of the driving gear is covered over to protect the parts from dust, and straps are fitted on the gear casing so that the cycle, when closed up, can be readily



FIG. 1.

slung over and fastened to a light pack, which prevents all friction against the rider's back.

The machine complete weighs from  $26\frac{1}{2}$  to 30 lbs., and the operation of closing it or opening it out only takes up a few seconds. The C-spring which carries the saddle has sufficient elasticity to do away with the vibration and to make the machine a comfortable mount with ordinary solid tires. With this bicycle the cyclist can use the roads at all times when they are practicable, and when he has to take the fields, or is within touch of the enemy, it can be closed up and carried, and is thus always available at any moment either to resume the journey or to aid in beating a speedy retreat.

The writer naturally sees a great future for bicycles of this type, and advocates that each of the independent cavalry divisions should have a



cyclist corps specially attached to it, which would necessitate the formation of five cyclist battalions, each of six companies. As for the corps infantry, he recommends that each army corps should have one battalion, and suggests that the existing Chasseurs à pied should be converted into cyclists, except the twelve battalions specially destined for the defense of the Alps. As there are now thirty battalions of Chasseurs, two additional battalions would have to be raised, one for the 19th Corps and the other

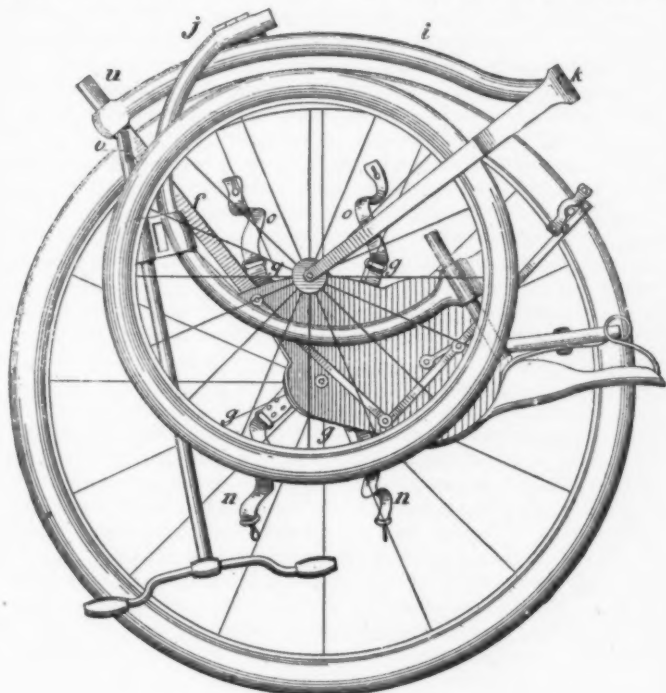


FIG. 2.

for the 20th Corps when organized. This would necessitate the addition of eight more battalions, two for the corps infantry and six for the independent cavalry divisions, and would give a total force of cyclists of 32,000 men in round numbers. The approximate cost of equipment would come to 8,000,000 francs, allowing £10 for each bicycle. Apart from the general question, which is sufficiently important, the writer makes some valuable suggestions on the uniform of cyclist corps. If these corps are to be organized he strongly urges that the uniform should approximate as closely as possible to that of infantry troops. By adopting the same colors as are worn by the regular infantry the enemy will much more easily

be deceived; and as it is of the first importance that he should not be able to detect that his assailants form only a fractional part of the army which is operating against him, this alone should be sufficient ground to justify the uniform being the same. If the cyclists wear a distinctive uniform the enemy, as soon as he recognizes one, will know at once that he has only to deal with troops whose effective is small, and there will be no possibility of misleading him as to the force of his assailants. On the other hand, if the cyclists wear the same uniform as the infantry of the line, the enemy can form no deductions as to whether the force opposed to him is insignificant or otherwise. In the former case being recognized as cyclists, the enemy will content himself with detaching a body of troops sufficient to cope with the known effective of cyclists in the opposing army, and will not allow his general movements or arrangements to be interrupted. If the uniform, however, is not distinctive, the enemy will perforce be constrained to act with greater prudence, for he will naturally suppose the presence of infantry of the line, and as this would imply that the main force was probably not far distant he would the more readily be deceived as to the nature of the demonstration, and would have to take serious precautions in view of the probability of the effective of the forces in front of him being reinforced at any moment by the arrival of fresh line regiments. The same reasons are used by the writer to advocate the abolition of the distinctive uniform at present worn by the French Chasseurs à pied.—*United Service Gazette*.

#### KRUPP ALLOY OF NICKEL AND IRON.

The announcement that Krupp at Essen has succeeded in perfecting an alloy of nickel and iron, giving equal tenacity for thirty per cent. less weight than steel, will probably lead to the rapid introduction of quick-firers for field artillery, and the power that is first to recognize the fact will gain a greater relative advantage over its competitors than did the Prussians when they introduced the breech-loader for infantry. Hitherto the question of mobility has been the rock on which all quick-firers for field service have split. It has been found impossible to unite the requisite weight of shell and velocity together with the means of checking the recoil, the essential feature of the quick-firer, within the limits of weight conditioned by the power of the horses. The dead weight of any hydro-pneumatic jacket to check the recoil of the gun being so great that no margin was left for a weapon of sufficient power to fight a single loader of equal weight behind the teams, shot for shot; experience has shown that a single 12-pounder shrapnel was equal in effect to many lighter ones, and hence a greater total weight of ammunition had to be dragged about by the quick-firer battery. Roughly speaking, the material and moral effect of the shell against living targets increases almost as a cube of its weight. If, therefore, a quick-firer of equal power to the existing single-loaders can be mounted on a carriage which, together with its gun, does not exceed the limit of load permissible behind the horses, an immense gain will result, without necessitating an increase in the total weight of ammunition carried.—*Army and Navy Gazette*.

## EFFECT OF SMALL CALIBRE BULLETS.

Dr. Chauvel, of Paris, has communicated to the Academy of Medicine the record of a very interesting series of experiments conducted in Roumania with the new 6.5 mm. (.256-inch) rifle, which throw fresh light upon the effect of small calibre projectiles upon the body. They serve to show that this effect is much graver than many have believed. In one trial five bodies were placed one behind the other, some twenty inches apart, at a distance of 650 yards from the rifle. Of these, four were penetrated. In the case of the soft tissues the apertures of entry and exit were smaller than with the old rifles, and the injured part may therefore perhaps be expected to be smaller. On the other hand, at every range, up to 1500 yards, the perforation of the bones was always attended by much comminution and breakage. The lesions of the arteries were even more severe. With the old balls these vessels were generally torn, and often a hemostatic formation resulted, whereby the flow of blood was arrested; but with the new projectiles, which cut the vessels sharply, such is not the case. Even when pulmonary wounds, in the case of horses, did not involve the larger vessels, they gave rise to serious hemorrhage, which would not have been the case with the earlier weapon. Wounds of the liver and spleen caused no special remark, but, when the full intestine of the horse was struck, the wound was terrible in its nature. The doctors who witnessed these experiments, says the *Avenir Militaire*, were induced to conclude that the gravity of a rifle wound is in inverse ratio to the reduction of the calibre, and gave as the reason that the rapidity of the revolution of the ball is in this inverse ratio. These results do not confirm some earlier ones from which it was sought to prove that the small calibre projectile was apt to be "benignant" in its effects. Dr. Chauvel himself some years ago maintained, in the *Archives de Médecine et Pharmacie Militaires*, that, beyond the "explosive zone," that is at a distance greater than about 350 yards from the rifle, the small-calibre projectile generally passed through the body with little contusion round the orifice, seldom carrying with it pieces of clothing, whereby even healing by "first intention" might be secured. Dr. Bruns, of Tübingen, a well-known German authority, has held still more optimistic opinions on this subject; but later inquiries seem to show that these views must be modified. —*The Army and Navy Gazette*.

## CAVALRY FORMATIONS.

We are glad to notice in "the Army Book for the British Empire"\* the favorable remarks which the joint authors make on the squadron system in the cavalry, and the very true statement that our reversion to the troop system in 1870 was a going back to an obsolete organization only fit for the days of Gustavus Adolphus. They tell us also that this improvement has been effected by an "easy revolution." What, however, strikes one as strange is that, while discussing the infantry, the authors condemn the parallel system of dividing the battalion into four companies. For, as all the world knows, the tactical formations of infantry in action have changed far

\* By Lieut.-Gen. W. H. Goodenough, R. A., C. B., and Lieut.-Col. J. H. Dalton, R. A. See review by Captain Chester.

more than those of cavalry; and while it is now almost as easy as in the days of the Thirty Years' War for a cavalry colonel to direct eight troops in action, it has become an utter impossibility for one man to direct on a modern battle-field eight independent extended companies. Every word which is said on p. 195 in favor of the squadron as compared with the troop organization applies with double force to the four-company organization as compared with the eight-company organization on page 147.

There appears to be no point in the insinuation that paucity of officers alone has driven foreign nations to halve the number of companies in the battalion; because, as a matter of fact, the foreign battalion has as large a proportion of officers to men as our own. And if indeed the Continental organization be better than the British in all except that it does not provide a sufficient proportion of officers to men, the course is evidently to adopt that system in all except that we should provide a larger number of officers to the large company; a matter easily settled. It is obviously absurd to talk of one organization "giving" this proportion and another "giving" that. We are free to "give" what proportion we like or what we can.

It would seem to us that it would be as "easy a revolution" to combine into a consolidated unit two companies in an infantry battalion as it is so truly stated it has been to consolidate two troops into one squadron in the cavalry; and this consolidation can be as readily carried out in the infantry without altering the present proportion of officers to men as it has been in the cavalry. Of course, as is very properly observed in the work before us, the large company could not be substituted for the small one without a tactical subdivision of the command. But who would dream of its being otherwise? Certainly not the Prussians, who invented the four-company division, now adopted by all nations but our own. With them the large company is permanently divided into three *süße*, or platoons, of some 75 men each, and these are as permanently constituted units as are our own companies. There has been an entire misconception in England in this controversy as to the respective merits of the four-company and eight-company organizations, brought about by a similarity of terms. It is the German *sug*, rather than the *kompagnie*, which corresponds tactically with what we call a company.

The Prussians went beyond us in recognizing that a company might be too large. They therefore substituted twelve *süße* of about 75 men for our eight companies of 100 men in the division of the battalion, on the understanding that these were to be clubbed, in trios, into four miniature battalions, called *kompagnies*, which again formed the battalion. Their whole system of battalion drill shows this to be their conception. With them the battalion is handled on parade as a miniature brigade might be with us; the *kompagnies* often being in line of columns, while normally the *süße* composing them are always in line. In the battalion drill of the British army we have no "lines of columns," and companies much larger than the *süße* are normally always in line. We hope the day may not be far distant when the present organization of the battalion in the British army will be recognized to be only fit for days in which men fought keeping the touch shoulder to shoulder, and when we shall diminish the strength of companies to

some 70 men, conjoined by threes into four component parts of the battalion. The names of the units and the titles of the officers have evidently very little to do with the matter.—*The Army and Navy Gazette*.

## ALUMINUM.

Trial is being made in the squadrons of the Soudan Spahis of new saddles of which the tree and stirrups are made of aluminum. The saddles are of the regulation pattern, and the price is the same, but the weight is about  $6\frac{1}{2}$  lbs. less.—*Revue de Cavalerie*.

The Artillery Committee has recently issued a memorandum on the subject of the use of aluminum in various articles of war material, in which the opinion is expressed that the metal could probably be employed with advantage in many parts of artillery wagons which do not require to be constructed in a very solid manner. It is calculated that if this be done the weight of the limber for the 9-cm. gun will be so far reduced as to admit of 20 or 25 additional rounds being carried. General Engelhardt is at present occupied with the question of providing the field artillery with a new type of limber which can be drawn by two horses; and the committee consider that it is advisable to adopt aluminum in lieu of heavier metal in all those parts where its use is admissible.—*Revue d'Artillerie*.

## A NEW BRIDLE-BIT.

A new bridle-bit has been invented by a German, which is being tried with satisfactory results in several cavalry regiments. The surprise of small as well as large patrols and reconnoitring parties by the enemy during the Franco-German War has demonstrated the risk which is run when, at the moment of a sudden attack, the head-gear of the horses has been temporarily removed for feeding or watering, and cannot be replaced with sufficient speed.

The left cheek of the bit is fitted with a small bolt, which fastens in a downward direction. On raising this bolt and pressing the cheek outward to an angle of  $45^\circ$ , it can be detached without difficulty from the mouth-piece, which will then glide easily from the horse's mouth, and may be temporarily attached to the cheek behind the curb-chain, thus affording the possibility of feeding or watering without removing the head-stall. In the space of a few seconds the bit can be replaced in position and refixed by reinserting the mouth-piece from the right, raising the bolt a little, and fixing the cheek to the mouth-piece by a slight jerk; the bolt relocking of its own accord.—*The Army and Navy Gazette*.

## Reviews and Exchanges.

### Artillery: Its Progress and Present Position.\*

THE book comprising some 450 pages of reading matter is generously illustrated. It is divided into two parts, with the object as stated in the preface of reserving Part II. to a theoretical consideration of gunnery, so that those who wish to go into calculations can do so, whereas others who are not so inclined can study the practice of gunnery without being troubled with figures. To the business connection of the authors with the Elswick works must be attributed an unfortunate characteristic of the book, which if not detracting from its actual merit, at least causes it to fall far short of presenting a comprehensive account of either the "progress" or "present position" of artillery, except in a general way from English sources and particularly as practiced at Elswick. It is not a book of easy reference since the methods lead to repetitions and the statements often lack a desirable definiteness and completeness. As an example of this and touching the interesting question of the changed dimensions of powder space due to the use of smokeless powder, it is stated that in the first 6-inch quick-firing gun a charge of no less than 55 pounds of ordinary powder contained in a cartridge case nearly 38 inches long was necessary to get a "good" velocity; whilst the necessary length for the present 15 pounds cordite charge, giving a much higher velocity, is only 23 inches. The value of the work as a scientific essay is not great. The scant treatment of internal ballistics, including theories of gun construction, and of external ballistics in the two chapters of Part II. will not relieve the student from the necessity of consulting more complete books of reference on these subjects.

But in view of the importance of the Elswick establishment and its extended operations the history will be found to at least touch upon most of the principles involved and cannot fail to be of interest. Moreover, occasion is taken by the authors to present intelligent and in the main sensible views in discussion, whilst valuable general descriptions and illustrations of the material are given in Part I. and the Appendix.

In advocating preparation for war and as an instance of the follies committed when material is called for under sudden emergency the following story is told: "Some guns were ordered during the Crimean war from an American contractor, whose sharp but dishonest commercial instincts led him to take advantage of the situation by offering guns at a price per ton. Those who dealt with the question in England presumably expected large powerful guns corresponding to the weight contracted for, but they received their full weight in blocks of cast-iron with a small hole bored up them." Comment on this is perhaps unnecessary, yet if the story be a true one, the presumption that the English agents acted in collusion with the contractor seems a probable one.

It was the practice in England until recently to determine the qualities of steel gun forgings from the treatment and test of small pieces, and then subjecting the forgings to the treatment indicated as good for the test pieces. This has now been changed to conform to the generally accepted practice in other countries and requires the tests to

\* *Artillery: Its Progress and Present Position.* By E. W. Lloyd, late Commander R. N., and A. G. Hadcock, late R. A. J. Griffin & Co., Portsmouth, 1803. Van Nostrand: New York.



be taken from the actual forgings after treatment. Between the years 1875 and 1879 some forty wire guns, the largest being about 10 inches calibre, were built at Elswick. The wire construction was then discontinued in England until 1892 because, guns built in the usual manner having ample strength, there appeared to be no reason to accept disadvantages, and especially higher cost, for the sake of obtaining what was really not necessary. The reason assigned for its present revival in England is the introduction of smokeless powder accompanied by higher pressures in the chase and the opinion is expressed that wire will probably to a limited extent find its place in gun construction in the future. The reason assigned by the authors is hardly legitimate since the experiments of L. V. Benet with a 57 mm. Hotchkiss gun published in the *Journal of the U. S. Artillery*, Vol. I., No. 3, have shown that the pressures from the smokeless powder charge fell below those of both the black and brown powder charges towards the muzzle. It may rather be surmised that the present era of wire gun building in England is due to the views held upon the subject by the present director of the Woolwich establishment with the support of public opinion as influenced by the failure of the heaviest hooped guns (110 tons) in which the English makers have been singularly unfortunate. The English have not been successful leaders in modern gun construction and it is to be expected that if success was lacking in making hooped guns through failure to properly appreciate the needs of that method of construction, then a worse result will follow in adopting the more intricate methods of wire construction.

The Elswick works have been particularly distinguished for the development of hydraulic machinery. The application of hydraulic power to the working of cranes and similar machines was first made by Lord Armstrong, and Mr. G. W. Rendel has been chiefly instrumental in the present very complete development of hydraulic gun mountings. For naval use the hydraulic system is preferred to steam, air or electricity, but the demand for the alternate use of hand working is recognized and the latest Elswick design for hydraulic turret with 12 inch guns provides that every operation can be done either by hand or power. Hand worked naval gun-mountings, hydraulic gun-mountings and quick-firing guns form the subjects of several of the more interesting chapters. The hydro-pneumatic disappearing carriage described and illustrated in connection with coast-defense guns and mountings is a good illustration in the main of the pneumatic disappearing carriage the trials of which at Sandy Hook have recently attracted attention.

The heaviest quick-firing gun is the 6-inch (6.5 tons) of 40 calibres length with projectile weighing 100 pounds. The initial velocity with a charge of 20 pounds of cordite is 2500 f. s. From another source—letter of Sir Andrew Noble to the *London Times*—we learn from experiments made by him, the maximum pressure being limited to about 17 tons per square inch, the following results were obtained with a cordite charge in a 6-inch gun firing a projectile of 100 pounds weight, viz.: in a 40 cal. gun, 2794 f. s.; 50 cal. gun, 2940 f. s.; 75 cal. gun, 3166 f. s.; and in a 100 cal. gun, 3284 f. s. velocity. And he also states that with a 42-pound shot and a chamber pressure of 27 tons per sq. inch a velocity of 4980 f. s. was secured. It appears that separate loading of the cartridge case and projectile is used in the quick-firing English guns of calibres above the 6-pounder. Cordite was found to wear out the cases much more rapidly than other powder, probably on account of the extra heat developed and special treatment has been found necessary to meet the difficulty. Electrical primers, placed in the base of the case, are used in the ammunition of the quick-firing guns. The composition for ignition is a mixture of gun cotton dust and meal powder together with a few strands of pure gun-cotton, placed in contact with the bridge in the primer. An electric sounder which is usually connected with the mechanism gives warning, if everything



is in order, directly the gun is loaded and in the firing position. These electrical primers fixed in a cartridge case containing a small charge of cordite are also used for discharging (launching) torpedoes from ship-board. A description of the Elswick electrical night-sights for guns is given on page 254 *et seq.*

Perhaps the least satisfactory treatment accorded to any one important subject in the text is that of gun construction. The account of shop operations is sufficiently meagre, but the only directly practical application of the formulas given in relation to the building up and the strength of hooped guns in Part II. is confined to the deduction of the pressure which a 6-inch gun might sustain. The absence of such application of the formulas and of any statement of the shrinkages applied in the 6-inch, or other guns, leads to the inference that the authors have not given the formulas which are actually employed in the manufacture of guns by the Elswick works, or elsewhere. The formulas and discussion given may answer sufficiently well to present a certain analysis of principles, but lack point and accuracy. The failure to present data for the shrinkages of hooped guns is regrettable as it might have relieved the impression that until a very recent date at least, the shrinkages of English hooped guns were determined by what amounted to little more than a rule of thumb, and to the neglect of the careful and exact methods in vogue in other countries. The formulas used for the strength of the 6-inch gun in the example given are the same as those of General Virgile which are based upon the principle that the hoop tension may be taken equal to that of the free specimen, but neglect the additional strains or displacements of fibre present in the gun. Just as in a specimen bar: if the bar is subjected to tension alone, the elastic limit is defined by the force which may be applied without producing permanent set; but if the bar is subjected at the same time to pull and to pressures on its sides, the elastic limit for tension will be less than before. Similar formulas have therefore been discarded in this country for others which are based upon the principle that none of the fibres of any cylinder in the structure shall be elongated or contracted beyond the elastic limits determined for such displacements by the free tests of the metal.

But a more serious error appears to permeate the discussion in that the overcompression of bore which may result from over shrinkage of hoops or an excess of wire tension is ignored. As a consequence of this, principally, the conclusion follows that great economy of material, or greater tangential strength for the same thickness of gun, is effected by wire winding in place of hooping. There appears to be, however, no safe ground for such conclusion and it may be said in general that an apparent advantage of this nature for wire guns as ordinarily constructed can be described only when compression of the bore beyond the elastic limit is resorted to. As an illustration of the extent to which this departure from principles may be carried, Mr. Longridge has in one of his discussions assumed 51 tons per sq. inch, or from 2 to 3 times the stress that would cause permanent set in a free specimen of steel, to be a safe compression load at the bore of a gun in repose.

In general the elastic strength of a gun is directly dependent upon the product of three factors, namely: the range of movement of bore, the thickness of the wall, and the modulus of elasticity of the metal. The modulus of steel wire is not higher than that of hoop metal. Therefore, given the same tube, limited as it should be to the same safe limits of extension or compression, in the two cases, it follows that the wire envelope must be of the same thickness as the hoop envelope to make the strength of the wire gun equal to that of the hooped gun. And in practice the number of layers of hoops can be made sufficient to get all the work out of the vital member—the tube—that it should be called upon to do. The present writer believes that wire guns are out of date, that their place in the process of development belonged to the period when steel could only be safely and properly made in relatively small pieces. The art

of steel making has already passed that stage and the decreasing number of members used in the hooped gun from year to year marks the right steps of progress towards solidifying the gun structure.

R. BIRNIE.

February 12, 1894.

Captain Ord. Dept.

### The Army Book for the British Empire.\*

The ground covered by this work is so extensive and the information which it contains is so varied, so valuable, so well arranged, and so well indexed, that the book becomes a veritable *vade mecum* for the British army. It is not a book to be read and laid aside, but one to be kept within reach, as a book of reference, whenever exact information about the British army is required. Such a book is difficult to deal with within the limits of a review article. Its pages are packed with information already reduced to its lowest terms, and it is almost impossible to give any adequate idea of its contents.

To a reviewer the preface of a book is always one of its most important chapters. He fancies that he can discern in it a kind of shadow of the author's own opinion of the work. The preface, therefore, is always carefully read. In this case we learn that the author, or rather authors,—for the title page bears the names of two distinguished officers—expects criticism upon certain points. Why he does so is difficult to determine. He assumes, without sufficient warrant we think, that the "Modern System in English garb" is a legitimate son of the continental system, and he is sorry perhaps, that he is so little like his father. For our own part, after reading the volume through, we can see nothing foreign about him. He is British Imperial, and his mother was Necessity.

The evolution of the British Empire is one of the miracles of modern times. Without special intentions on the part of the government, and indeed sometimes in spite of its intentions, the British Colonial Empire stumbled into existence, and like the principal in a game of blind-man's-buff among the nations, groped its way along, until it finally fell into a shape and condition remarkably well suited to the wants of the nation, and actually capable of a kind of defense. Short sighted people sometimes say the British Empire is an accident growing out of Jenkin's Ear. Map No. 2, at the end of the volume, gives us a glimpse of its magnitude, and we can readily conceive its character and requirements. The British Empire is the Empire of the Seas, and it can be defended only by naval supremacy. The army constitutes the second line.

The vicissitudes of the British army prior to 1872 are lightly sketched in the second chapter, and we recognize therein many a parallel to our own experience. The Anglo-Saxon race has always been brave and warlike, a fighting race wherever found, but never military: on the contrary, always unmilitary. How they have escaped destruction in the great struggle for existence is simply marvellous. And they have not only escaped destruction, but have established themselves as the ruling race on this planet of ours. That they have done this in spite of much mismanagement almost makes one doubt his own powers of discernment, and suggests the idea that what the world means by management may be only foolishness after all. We know how Jack and Tommy Atkins were procured in the olden time when the British Empire was abuilding. They were not as a rule the *élite* of the nation. And their service always "Had far too much of a penal character" (26) in it. Yet look at their history. Look at their work. Is that the legitimate fruit of such material and such mismanagement? Or is there "A divinity that shapes our ends"?

In spite of an obstinate but honest conservatism, the British army was driven into

\* *The Army Book for the British Empire.* By Lieut. Gen. W. H. Goodenough, R. A., C. B., and Lieut. Col. J. C. Dalton (H. P.) R. A. Eyre & Spottiswoode, East Harding Street, Fleet Street, London, England.

efficiency, whether it liked it or not. At the close of the Napoleonic wars, the nation exhibited a strong inclination to go to sleep on military matters. Necessity compelled additions to the numerical strength of the army from time to time (25), but methods and material remained exactly as the peace found them. They seemed to think that there never would be any more war. Even the Duke of Wellington was unable to arouse the nation to a realizing sense of its danger (42). But nations are not permitted to shirk their duties for any length of time. If the warnings of the wise are unheeded, Providence has other ways of wakening them up. And England was aroused in this way. First came the Crimean war and then the Indian mutiny, at the end of which England found herself considerably shaken up, but awake. Yes, wide awake. Perfectly conscious of the fact that she had been asleep, and had narrowly escaped serious disaster. When Providence puts forth his hand to help, there is no mistaking his meaning. England realized that preparation for war was a duty which no nation can shirk with impunity, and she went to work on the problems which it presented without blowing any horns about it. And she was thus employed when the Civil War broke out in America in 1861 (43).

Most of the nations of Europe were slow to acknowledge the importance of the American war to the military student. They could see nothing in it, which is not to be wondered at, as the war correspondent who furnished the facts saw nothing in it himself—at least nothing of its real meaning—and his facts were twisted to suit his fancy. But the spectacle which it afforded the English student, aroused as he was from a slumber of almost forty years, "was well calculated to give a vital reality" (44) to his studies. And the stimulus thus imparted was continued and enhanced by the Schleswig-Holstein war in 1864; the Seven Weeks' war in 1866; their own little Abyssinian war in 1868; and the great Franco-Prussian war of 1870-71. The result of this prolonged gestation was the introduction into England of what the author calls "The Modern System" (48).

It is curious to note, that so far as the British army is concerned, the idea of regimental localization originated in the mind of Mr. Pitt during the early years of this century (64). But popular opinion was not yet educated up to that point. It required the astounding successes of the Prussian armies in 1866 to convince them that there was anything in it. And conviction was followed by action within the year. A Royal commission had been created to consider the subject of recruiting, and many collateral problems came before it for solution. Among these may be mentioned the creation of a reserve; the amalgamation into some kind of unity of the regular, the militia and the volunteer forces of the crown; so that all should be under the same general officers; the same discipline; and at least similar training and instruction. A solution for all these problems was not easily found, and it is not surprising if the British War Office "sought to adapt the continental system to English exigencies" (64).

But this was not an easy task. The English problem was peculiar. Prussian army organization was excellent for Prussia. That it had been copied with more or less exactness by so many military nations might be accepted as proof of its superiority, but not necessarily of its suitability to the British Empire. It is very simple and therefore very beautiful and easily copied; but does it guarantee success? To that we are compelled to answer, no. Organization needs skillful manipulation to achieve success. Prussian success was not wholly due to Prussian organization. What advantage is it to own a German flute if you cannot play upon the instrument? Would it pay to keep it in the family until a genius turned up who could get music out of it? That is what the nations do who adopt the Prussian organization but take no adequate measures to acquire the Prussian skill. Nations must trust to Providence for the genius. He cannot be made. But men may be taught to play simple tunes upon the instrument.

Skill can be acquired ; and skill is indispensable. It must pervade the whole military hierarchy. Each member must know when to play and when to pause, if harmony is to be had—what to prescribe and what to leave discretionary. Since the introduction of the telegraph the tendency is to command too much. There is too much centralization. Organization is rarely permitted to show its usefulness. Such centralization would ruin even a Prussian army. So we say, that Prussian organization, without Prussian skill and decentralization, is apt to produce an army very much like a balky team—less useful the larger it is.

But England has not copied the Prussian system or that of any other nation that we know of. The "Modern System" has been given its "English garb" for certain stated reasons, the principal of which seems to be the necessity to "trust in the population and in the great qualities of which it has ever given evidence" (87). Now that sounds like democratic twaddle, and there seems to be no necessity for its introduction. The Modern System has for its great characteristic feature *Compulsory Service* and its ultimate goal is a nation in arms. The English system has for its great characteristic feature *Voluntary Service*, and its ultimate goal is a very small portion of the manhood of the nation trained to arms. And the foundation upon which it rests is the necessities of the British Empire. If the question had been simply the defense of Great Britain a very different system would, no doubt, have been devised.

The Modern System in English garb is not an imitation or adaptation of any other existing system. It is altogether an original structure, and English to the backbone. The necessities which produced it become more and more apparent as we read. Battalions on foreign stations had to be maintained at or near war strength. Hence the necessity for a linked battalion at home. An annual reinforcement had to be sent to the foreign battalion, and it was the duty of the home battalion to enlist, drill, train and instruct that reinforcement and be ready to dispatch it annually on a certain day (103). Then, at the end of a certain period, the battalions changed places and the routine of duties proceeded with the least possible disturbance from the change. Altogether we admire the English system as one perfectly adapted to the work it has to do, and at the same time in harmony with the spirit of the English people.

The linking of regular battalions is, as we have seen, an important feature of the new system ; and perhaps the next in importance is the association of militia and volunteer battalions with the regular battalion on home station, so as to constitute what is called a territorial regiment. The normal organization of such a regiment is 2 regular and 2 militia battalions with one or more volunteer battalions attached. But there are many exceptions to the rule. Some regiments have only one militia battalion and some in Ireland have four. Why such a want of uniformity should be permitted to exist is not clearly made out.

But want of uniformity is not confined to regimental organization. In enlistments we find such variations as to the term of service with the colors, as are difficult to account for, especially as the variations seem to depend entirely on the caprice of the men (132). Perhaps the necessity of maintaining in the home battalion three classes of men has something to do with it. There must be a certain number of men in their first year's service, a certain number in their second, and a certain number in their third. The number in the last class should be that required for the reinforcement of the battalion abroad. We observe also that the localization of regiments is not permitted to restrict recruiting. A man can enlist in a regiment whether he belongs to its district or not. Still the regiments are slowly becoming local. We notice that in 1892, there were 53,000 men in their local regiments (131).

There are some features about the appointment and promotion of non-commissioned officers which are worth noticing. Corporals are appointed by captains, but promo-

tions are made by seniority, to the higher grades provided the requisite educational and professional examinations have been passed. The educational standards are those of civil schools—for corporals the IV; for sergeants the V; and for sergeant-major the VII class.

Commissioned officers are appointed from the cadets of the military college; the militia after examination; and sergeants in the ranks. Promotion to include the grade of major is by seniority if found qualified; but rank does not carry with it any right to command. No officer can command a battalion, or even be second in command, unless specially recommended (131).

The *Dépôt*, as the headquarters of the Regimental district are called, is a very important station. There the men are recruited and trained, and there the militia and volunteers are brought into the closest relations with the regulars. The adjutant of the *Dépôt*—a regular captain—is also adjutant of one of the militia battalions, and the recruiting officer or the quartermaster—also regular officers—is adjutant of the other. Regular and militia recruits occupy the same barrack rooms, and are subjected to the same discipline and drill, except that the militiaman is pushed over the course at a faster gait, as he has only 49 working days for his training (137). Militia recruits are drilled by regular sergeants.

The battalion of 8 companies is the unit in the British service, tactical and administrative. It is commanded by a lieutenant-colonel with a major as second in command (143). The territorial regimental organization exists chiefly for recruiting purposes, and as a means of bringing militia and volunteer battalions under the command of regular officers and into the closest association with regular troops.

With reference to the larger size of continental companies, the author uses the following words: "It would be felt that 250 of our bayonets and rifles would be rather thrown away, if disposed of by one commander" (147). There is room for much thought on that subject. The most effective and economical size for a company of infantry has yet to be determined; but the German company is unquestionably under officered. This necessitates the delegation of duties to non-commissioned officers which do not properly belong to that class. It may be a cheap way of commanding men, but cheapness is not always economy.

We notice a few points in passing about the internal economy of companies and the management of men, which are interesting, although probably generally known. The British soldier is paid by his captain, who receives weekly remittances for that purpose from the paymaster. The pay of a private of infantry is 1s 2d per day; that of a sergeant-major 5s. The ration furnished by the government in time of peace, is  $\frac{3}{4}$  lbs. of meat and 1 lb. of bread. Vegetables and groceries cost the soldier about 3d per day. In war times the whole ration is furnished by the government.

Underwear is not rated as clothing in the British army, but as necessaries. The recruit is furnished with his first outfit free. He must maintain that outfit at his own expense. Outer garments are called clothing and remain the property of the government (151).

The drill and training of the British soldier have always been excellent. Nor is his mental training neglected. Schools are maintained at every station and all soldiers who have not obtained a certain certificate of proficiency are required to attend. Regular instruction is given, not only in the ordinary common school subjects, but in Field Sketching, Fortifications, Signalling and Pioneer and Transport Duties.

The canteen, according to Mr. Childers, British Secretary of State for war in 1882, is a "well regulated beer-shop." But it is much more than that. It is the soldier's coöperative store. It is a coffee room; a lunch room; a general merchandise store; a reading room; a library; a theatre; a shooting gallery; and a nine pin alley. All these

are maintained from the profits of the canteen, and in addition regimental sports of all kinds are liberally subsidized, but not a penny seems to go to the soldier's mess (164). The author adds, that "The army, without knowing it, has for nearly 30 years been in the enjoyment of \* \* \* the Gothenburg system."

The changes in the British army since their last great war experience, have been immense. Whenever and wherever an apparent improvement has disclosed itself, the ever watchful English eye—ever watchful since 1858—has been on it, and if its merits seemed to warrant it, it was copied in their army. Our own experience led them to adopt mounted infantry, and the chapter devoted to that subject (ix) is one of the most interesting in the book. So also in regard to cavalry. Not only are the British minutely described, but also continental cavalry receive attention and comparisons are made which bring out advantages and defects in such bold relief that even laymen can understand and appreciate.

British artillery is undoubtedly the best trained and equipped artillery in Europe. It consists—that is the regular part of it—of 22 batteries of horse artillery; 84 batteries of field artillery; 10 batteries of mountain artillery; 68 companies of garrison artillery; and "The district establishment." This last is a feature which will have to be copied in this country before long. There are on the coasts of Great Britain many small, ungarrisoned defensive works. These are now, for the most part, armed with modern guns and equipped with all the machinery and instruments necessary for their service, as much, perhaps, for the convenient instruction of volunteer batteries as for harbor defense. But these volunteer batteries occupy the works only for a few weeks, and if they were left without care during the rest of the year they would soon be ruined. To prevent this a number of skilled non-commissioned officers and men of the Royal Regiment were set aside as a permanent resident staff of care-takers for these works. Each work has its resident staff and each group of works has a commissioned officer in command. These are known as the "District Establishment." If the ordnance sergeants in charge of our ungarrisoned works had each one gun detachment of well trained artillerymen under them, which they ought to have, they would then become the equivalent of a district establishment.

The chapter on the Royal Artillery Regiment is very complete, giving in great detail the methods of instruction pursued both for commissioned officers and enlisted men. But we must pass it by. It is impossible to condense such a condensation, or to give in a paragraph any idea of the information contained in the 20 well packed pages devoted to the subject. We can only refer inquiring artillerymen to the book itself.

The Royal Engineers, we are informed, is the oldest corps in the British army. It existed long before the discovery of gunpowder, and, like everything else of any value, came in with the Conqueror (235). Although purely a military corps, its officers were known by their engineer titles until 1782. In that year directors became colonels; sub-directors, lieutenant-colonels, engineers in ordinary became captains; and sub-engineers, 1st lieutenants (239). The chapter treats of the organization, training, duties, history, distribution, uniform and pay of the Royal Engineers. It is a chapter that will pay perusal; but it cannot be condensed.

The British army is supplied with officers from various sources. Those for the cavalry and infantry come through the Royal Military College at Sandhurst; from the militia; from the universities; through the colonial military forces; from the colonial universities; and from the ranks. There seems to be no exclusiveness in the British army. Commissions even in the Royal Artillery and Royal Engineers are given to men from the ranks who possess first class certificates of education. From all other sources rigid examinations are insisted on.

Men are obtained by voluntary enlistment, and it is evident from the strictness of



the recruiting regulations that they can be obtained in sufficient numbers without much difficulty. The measures recently taken for providing employment for soldiers passing from service with the colors to the reserves cannot but be a great help to recruiting (328).

Examination for promotion is the rule in the British army. For the grade of captain the examination includes tactics, fortification, topography and military law. To assist officers in their preparation for examination they are provided—not with a set of text books, but—with a qualified staff officer as garrison instructor. Of late this garrison professor has had absolutely nothing to do, as the average of military knowledge has reached such a high standard that examinations have no terrors any longer (342). There is no greater delusion on the face of the earth than the belief that the military profession, in any of its branches, can be learned from books.

The militia of England has a history, dating from the reign of Edward I., of which any body of men might be proud. It has stood by the nation in every emergency. In 1812, 214,000 men of this class were in service besides over 100,000 recruits which it sent from its ranks into those of the regular army. The majority of the English troops that fought at Waterloo were volunteers from the militia (362).

From 1815 to 1852 the British militia seems to have ceased to exist; but in the latter year it awoke, and has been a living organization ever since. The peculiar feature about the British militia, and that which gives it its high character as a military force, is undoubtedly its close affiliation with the regular army. The 3d and 4th battalions of every regular regiment are militia battalions. The Yeomanry, a species of volunteer cavalry, numbered in 1891 8471 men (377). The British Volunteers number at present 225,423 men.

What is now known as the War Office is the final outcome of a long series of experiments in administration which for absurdity and powers of circumlocution have, perhaps, had no rival in any nation. As it now exists it is considered to be an efficient piece of administrative machinery, and it certainly is when compared with that from which it grew. But any one that imagines it to be a simple machine has only to read the 22 descriptive pages devoted to it in this book to get rid of the idea. Not that the description is obscure. It is the machine that is complicated. There are wheels within wheels in it; but they all belong to one machine now. Formerly they constituted a conglomeration of collateral independencies which spent most of their time in memorializing each other.

The popular idea of military men is that they are merely fighting machines. A glance at the chapter on military education in this book ought to induce a modification of that opinion. It would be impossible in a paragraph to give any adequate idea of the scope and extent of the professional education now provided for the English army; but one rises from a perusal of the 30 pages devoted to the subject with the distinct conviction that the army ought to be added to the learned professions forthwith. We shall merely mention the names of the various establishments now in operation.

*The Royal Military Academy* at Woolwich educates cadets for the artillery and engineers.

*The Staff College* at Camberley educates and trains officers selected by competitive examination, in the higher branches of the profession.

*The Artillery College* at Woolwich is the technical school of artillery for the instruction of selected officers and men of the Royal Artillery, the Royal Navy and other government departments.

*The School of Military Engineering* at Chatham, for the instruction of engineers.

*The School of Gunnery* at Shoeburyness.

*The Military College* at Sandhurst.



The School of Musketry at Hythe.

The School of Signalling at Aldershot.

The Army Medical School at Netley.

The Army Veterinary School at Aldershot.

The Royal Military School of Music at Kneller Hall.

The functions of these establishments are sufficiently indicated by their names.

In the application of the military knowledge obtained at these institutions England is somewhat hampered for want of room. Manœuvres of large bodies are impossible in England. The best field she has for that purpose is Aldershot where a division can be quartered and manœuvred. The next best, perhaps, is "The Curragh" with accommodations for a brigade. But the British army at home has no such opportunity for field manœuvres as continental armies have. In India, however, where a large part of the army is always on duty, facilities for field manœuvres are abundant (428).

Artillery practice seems to be amply provided for. We see that there are practice camps and ranges at Okehampton, Glenbeigh, Hay, Lydd, the Isle of Wight, Shoeburyness and Dundee.

The army in India occupies 34 pages of the book, and the author manages in that small space to give the reader a very comprehensive view of it. The military power of India is much greater than many people imagine, and it is constantly on the increase. Since the Mutiny the Government of India has been successfully occupied in "making the British Empire of India safe; in making its people prosperous; and also, thank God, in making them loyal" (450).

The mobilization of all available forces at home, for defense, has been thoroughly thought out and practically provided for. The reserves, the militia and the volunteers all know where to go and what to do the moment the mobilization order issues. The vexatious formalities which the law imposed upon the executive in the olden times have all been removed, and the British army at home is now in a position to act promptly and effectively whenever occasion shall require. So also in the important matter of transportation, everything has been arranged in advance, and commanding officers not only know where to find what they need, but have ample powers under the law to promptly secure it (528). As to railways the state has the right to take possession of any of them, including their plant, whenever it may be deemed necessary for defense (531). Everything that could facilitate rapid mobilization seems to have been provided for, except shelter for the troops. The law still forbids billeting in private houses; but we hardly think that would be permitted to hamper the defense.

The transport of troops by sea has also been provided for in advance. Of course the regular transport ships maintained by the Imperial and the Indian governments would only carry a very small fraction of an army corps; but every suitable vessel under the flag is registered and may be called into service at any moment. The machinery by which this is effected is very simple and complete. The head of the Department is known as "The Director of Transports," and he has assistants in every port of the empire. Not only does he know every suitable ship, but he knows where she is and how soon she could be made available.

The amount of shipping required to move one army corps at a single trip is calculated to be approximately 250,000 tons, and that amount is not easily picked up, even in the ports of the United Kingdom (541). Thoughtless people talk about carrying an army of 100,000 men over the sea, as if it were an easy undertaking. As a matter of fact no nation could accomplish such a feat without long and laborious preparation, and the vast majority of nations could not accomplish it at all.

But we have already transgressed beyond the usual limit, and although we notice several passages marked for comment in the chapter devoted to "An Army in the

Field," we feel that we cannot do them justice at the end of an article. "The Army Book for the British Empire" is a handy volume to have on your book-shelf.

JAMES CHESTER,  
Captain 3d Artillery.

### Riders of Many Lands.

That Colonel Dodge's latest work is of distinct military value would hardly be inferred from its title.\* Yet that is its *motif*, from the point of view of one reader.

One may be a horse lover and yet not familiar with the horse for war purposes. To him the red-white-and blue thread woven into this genuine "horse talk" is evidence that, in his trotting around the globe, Colonel Dodge's "heart was true to Poll," and that his patriotism never cooled a moment amid all the temptations of foreign lands.

One of the first things noted is the Catholic spirit with which the subject of horsemanship is treated. Next to doctrinal questions there is no broader field for prejudice to disport itself in than in matters pertaining to the horse; his breeding, training, and use—especially under the saddle. The author brings to his work practical experience, among the various types of horses and riders described—not mere literary cleverness; and therein lies the value of the book as part of a cavalry library. Each chapter is devoted to a minute description and temperate criticism of the method of riding peculiar to one of a score of the principal countries of the world, with much interesting information as to the relative endurance, under the saddle, of various types of animals used—the horse, the ass, the camel, and the bullock.

Among the more valuable chapters, in this respect, is that upon long-distance rides, in which Colonel Dodge, after due mention of some of the best performances of modern cavalrymen, truly shows that the professional *raison d'être* for such experiments lies in the condition of man and beast for further work at the end of the ride.

Thus the late Austro-German long-distance race was a conspicuous and inexcusable display of cruelty to animals, without the slightest military advantage; and such also would seem to have been the result of the detail of a well-fed and high-spirited officer and charger, to carry Emperor William's despatch across country in the shortest possible time; the result of this experiment, if it has any value, tends to throw suspicion upon the condition of the German cavalry for an immediate test of endurance such as might be desirable in the event of war.

As a feat like that of the Oriental horse and rider (on page 226) of 950 miles in 45 days, may be mentioned the ride of Lieut. William P. Sanders, 2d U. S. Dragoons (afterward Brig.-Gen. U. S. V., killed at Knoxville) who, accompanied by a sergeant, set out at a moment's notice, from Fort Crittenden, U. T., March 30, 1861, in pursuit of deserters, who were caught by him in the neighborhood of Los Angeles, Cal., and turned over at the nearest post for trial. Sanders and the sergeant immediately returned to their post, arriving there on May 31, with the same horses, in good condition, having covered a rough and dangerous route of 1600 miles in 59 days; Sanders' mount—an average American horse—was used as an officer's charger for four years, during the Civil War, and fell, mortally wounded, within the Confederate lines at Winchester, in 1864.

The book is unique in its combination of what may be termed professional data with popular literature. Sound horse-sense is deftly intermingled with light gossip, on men and things, from a globe-trotter's standpoint. It is civil as well as military; it discusses sport in a Frank Forrester vein; and treats of arms and accoutrements, of military uniform and mufti; with respectful comments upon the fair equestriennes

\* *Riders of Many Lands.* By Theodore Ayrault Dodge, Bt. Lieut.-Col. U. S. A. Harper Bros. New York. 1864.

of Egypt and Hawaii and the utility of the divided skirt. The author does not lack audacity, going so far as to find fault with Phidias and to intimate that there are limits to British horsemanship.

If there are deficiencies in this work, they are of a character easily supplied—at least in another edition. The most serious one (and for this the publisher should share the blame) being the want of a table of contents. The illustrations are numerous, artistic and well printed.

A quotation from the closing chapter of this charming volume reads thus:

"But after passing in review the Riders of Many Lands, when I again set foot on shore in the United States I could not but feel that this country of ours is the home *par excellence* of horsemen. This idea is not, I think, bred solely of national pride; my readers will surely absolve me from narrowness or provincialism in the matter of equitation, or from any set scheme to rob other nations of their due. I am happy to admit, for it is manifestly true, that the best sportsman in the saddle is the Briton. On the other hand, the German is as far and away ahead of him in military riding—that is, in the drilling of bodies of horse—as the Frenchman is ahead of him in the niceties of breaking, training, and manege-riding. Where to place the Arab it is hard to say. With all due respect to the man or the race that produced the original strain of blood on which we all rely for our speed and endurance, I do not think that the best Arab is as good a rider as the best European or American; while the average Arab is, in efficiency, far below our riders under parallel conditions. The Cossack makes, no doubt, the best half-barbaric light cavalry in the world, and in his element is hard to equal. But after all it must be allowed that in some matters equine we Americans are preëminent. I will venture to claim that in distance-riding, which is perhaps the very highest form of horsemanship, we Americans are quite unapproached. Added to all this the fact that we have enriched the world with a brand-new type in the trotter, and that in racing and in polo and hunting we are fast catching up with our English cousins; and while I do not wish to "claim everything," I think—to recur to my original word—that it must be "allowed" that in all-round ability to breed, train and ride the horse to the very best advantage, the American is *primus inter pares*." So say we all of us.

T. F. R.

### The Points of the Horse.\*

Captain M. H. Hayes has written so many good horse books that he needs no introduction to readers of this class of literature. His latest production, which he calls "The Points of the Horse," might perhaps have been better named "The Points of the English Thoroughbred." The more comprehensive title, of the two, is apt to lead you to expect more than you get, for although many horses are noticed, the chief aim seems to be, to show you how to pick your winner out of a good field. The statement is true that books of the higher class are rare, and also that this special class of knowledge exists in a rather fragmentary form in our language. The author was not aware that the elaborate French work of Goubaux and Barrier had been translated in America, so it may be that he claims too much. Nevertheless his book has many excellencies over that of the French writers. It is well to have both.

The plan pursued is to illustrate the "points" by photographs done to a uniform scale. In this way the tendency to exaggerate, in the picture, what is described in the text, is avoided. As no horse has every good or every bad point, it was necessary to make a more or less careful examination of over 10,000 horses, in nearly every part of the world, outside of America. The result is shown in some 200 drawings from pho-

\**The Points of the Horse; A Familiar Treatise on Equine Conformation.* By M. Horace Hayes, F. R. C. V. S. Macmillan & Co. N. Y. 1893.

tographs and 77 reproductions of photographs. Pictures of Ormonde and St. Simon are given to show the highest type of the horse. The shire horse is taken as the opposite of the racer, and serves to show the differences between the animal built for speed and one calculated for strength. Other animals, which possess the points of strength or speed in the greatest perfection, are also shown.

Too much cannot be said for the illustrations. An artistic photograph of a horse is a hard thing to get. We are generally disappointed with the pictures of a famous horse; it gives no idea of his appearance as we see and remember him. But Captain Hayes' horses are different; there is nothing of the sleepy look about them; they stand at "attention" with head up, and in collected pose.

American readers will probably consider that the author has omitted a few essentials. He does not mention Remington among artists who draw good horses; he does not give a picture of Iroquois among his Derby winners; the saddle gaits of our Southern states are ignored; the American saddle horse, as well as the American trotter, have failed to get a notice.

But while there is no space for the glories of Sunol or of Nancy Hanks, or for other American horses of our day, the author is pleased to take us back to the days when the Orophippus roamed in Colorado at the dawn of Cenozoic time. From the fossil remains of animals resembling the horse, and from the legend of pre-Columbian discovery, he is led to disbelieve the accepted theory that the Spanish war horse was the ancestor of those found on this continent. That is all very well in its way, but there is excellent evidence of the terror with which the Indians regarded the cavalry of Cortez,—believing indeed that horse and man were a single animal of supernatural origin. It is also a fact, although sometimes disputed, that the Indian is a poor horseman. Even if they have had the horse only a hundred years it would be strange that they should know so little about an animal which is so valuable to them. As it is they know not how to breed or how to keep him; they cannot tell his age; their knowledge of his "points" is limited by the fat on his ribs. They beat and maltreat him from the day that he is foaled, and most likely they eat him when he dies. But that is a long story.

In a book that goes to some pains to describe the onager, the quagga, the kiang, and kindred breeds of asses and zebras, and which notices races of ponies from Iceland to Manipuri, we find no mention of the bronco, the mustang, the pinto or the cayuse. As a matter of fact the horse of our plains has many fine points. For strength and endurance he cannot be excelled. Under care and feeding he shows beauty of form, docility and speed. Probably he averages just as well as many horses with a better reputation.

It may be hard to decide what things could be left out of a book on the "Points of the Horse," but many readers would be glad to see something about the Hackney. This is a family of the horse with marked characteristics which he transmits with great certainty to his progeny. The hackney is becoming something of a "fad" now, and people are anxious to get information about him.

The following remark, which shows a fair sample of the leaning of the author's mind, will not be entirely approved in the United States: "As long as Australia and America have to obtain fresh infusions of blood from England to keep up the excellence of their respective breeds of race-horses, so long should no jealousy, as regards horses, exist between the mother country and her offspring, who should regard their state of dependency on her as one of her strongest claims on their affection and support."

Among books on the horse, none will be found in better style of printing, illustration and binding, and very few as well written and clearly expressed as this.

# Military Service Institution of the United States.

WASHINGTON, D. C., JANUARY 1, 1894.

*To the Members of the Military Service Institution of the United States.*

GENTLEMEN:

I have the honor, on behalf of the Executive Council, to submit the following report of the operations of the Institution during the year 1893.

The Treasurer's report for the year shows:—

|   |           |
|---|-----------|
| Balance on hand Jan 1, 1893 (cash and R. R. bond),  | \$6451.11 |
| Receipts during 1893,                               | 8868.38   |
| Expenditures during 1893,                           | 8262.75   |
| Balance on hand Jan. 1, 1894 (cash and R. R. bond), | 7056.74   |

The number of new members who have joined during the year has been 234. That this number is so much smaller than the gain of last year is probably due to the prevailing financial depression, which has apparently had an effect in diminishing the number of applications for membership.

The gold medal of the Institution for 1893 was awarded to Captain GEORGE P. SCRIVEN, U. S. Signal Corps, for the best essay upon "The Nicaragua Canal in its Military Aspect."

J. M. SCHOFIELD,

*Major General, President.*

## Report of the Finance Committee.

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### STATEMENT OF TREASURER'S ACCOUNT FOR 1893.

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|  |           |
|--|-----------|
| Balance on hand Jan. 1, 1893 (cash and R.R. bond), | \$6451.11 |
| Received during 1893,                              | 8868.38   |
| Expended during 1893,                              | 8262.75   |
| Balance on hand Jan. 1, 1894 (cash and R.R. bond), | 7056.74   |

We desire to commend 1st Lieut. J. C. BUSH, 5th Artillery, Treasurer M. S. I. for the ability and efficiency displayed by him in the management of the financial affairs of the Institution.

CHAS. H. TOMPKINS,  
*Ass't Q.-M.-Gen'l, U. S. Army.*  
*Chairman Finance Committee, U. S. M. S. I.*

THOMAS F. BARR,  
*Dep. Judge Adv. Gen'l, U. S. A.*

J. W. BARRIGER,  
*Lt.-Col. and A. C.-G. S., U. S. A.*

# Report of the Publication Committee.

NEW YORK CITY, January 13, 1894.

MAJOR WILLIAM L. HASKIN,

*Secretary Military Service Institution.*

SIR :—The Publication Committee of the MILITARY SERVICE INSTITUTION, has the honor to submit the following annual report upon the matters under its charge.

The JOURNAL has been published bi-monthly during the past year, under the able editorship of Major HASKIN and Lieutenant BUSH in a manner to reflect credit upon the Institution, and, as is believed, to benefit the military service.

Pursuant to the articles of agreement entered into in July, 1890, with Charles Merrill and Company of New York, the serial publication of historical sketches of the Regiments, Staff Corps and Staff Departments of the Army, has continued regularly, and is now well advanced toward completion. Under the resolution of the Council adopted at its meeting on September 8, 1893, the time during which sketches will be received has expired, and the records of seven organizations which have not furnished them will be prepared by the Secretary of the Institution from such official documents as may be available. The time during which the publishers were to be furnished with these sketches for publication in book form has already expired, and to meet our engagements at as early a date as practicable it will be necessary to give them more space in the JOURNAL during the present year than heretofore. When completed the volume will supply a need long felt in the service, and the Committee desires to place on record its appreciation of the study and labor which the Secretary of the Institution has devoted to its preparation.

Respectfully submitted,

HENRY L. ABBOT.

*Col., Engineers, Bvt. Brig.-Gen., U. S. A.*

R. P. HUGHES,

*Col., Ins.-Gen.*

CHAS. BRECK,

*Col., Asst Adj.-Gen., Bvt Brig.-Gen., U. S. A.*

FRANK H. EDMUNDS,

*Captain 1st Infantry.*

Publication of foregoing Report *Approved.*

J. M. SCHOFIELD,

*Major General, President.*



## Historical Sketches of the Army.

THE following named officers have volunteered, or have been designated to prepare Historical Sketches of their Corps or Regiments for publication in this JOURNAL.

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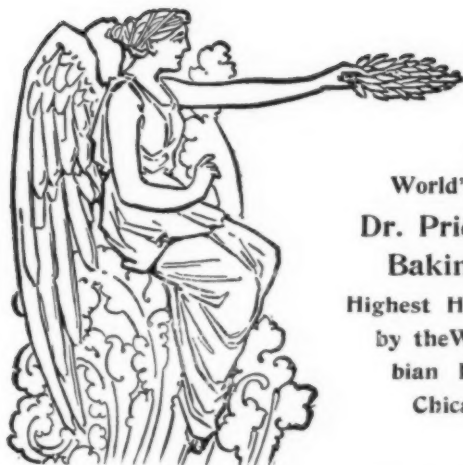
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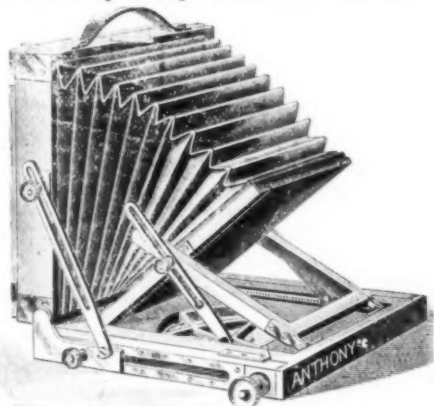
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"An Entrance Fee of Five Dollars (\$5) shall be paid by each Member and Associate Member on joining the Institution, which sum shall be in lieu of the dues for the first year of membership, and on the first day of each calendar year, thereafter, a sum of not less than Two Dollars (\$2) shall be paid as annual dues. Annual dues commence on January 1st in each year."

NOTE.—Checks and Money Orders should be drawn to order of, and addressed to, "The Treasurer Military Service Institution," Governor's Island, New York Harbor.

Changes of address should be reported promptly.



## Prize Essay—1894.

I.—The following Resolution of Council is published for the information of all concerned :

*Resolved*, That a Prize of a Gold Medal of suitable value, together with a Certificate of Life Membership, be offered annually by THE MILITARY SERVICE INSTITUTION OF THE UNITED STATES for the best essay on a military topic of current interest ; the subject to be selected by the Executive Council and the Prize awarded under the following conditions :

1. Competition to be open to all persons eligible to membership.\*
2. Each competitor shall send three copies of his Essay in a sealed envelope to the Secretary *on or before September 1, 1894*. The Essay must be strictly anonymous, but the author shall adopt some *nom de plume* and sign the same to the Essay, followed by a figure corresponding with the number of pages of MS.; a sealed envelope bearing the *nom de plume* on the outside, and enclosing full name and address, should accompany the Essay. This envelope to be opened in the presence of the Council after the decision of the Board of Award has been received.
3. The prize shall be awarded upon the recommendation of a Board consisting of three suitable persons chosen by the Executive Council, who will be requested to designate *the Essay deemed worthy of the prize*; and also in their order of merit those deserving of honorable mention.
4. The successful Essay shall be published in the Journal of the Institution, and the Essays deemed worthy of honorable mention shall be read before the Institution, or published, at the discretion of the Council.
5. Essays must not exceed twenty thousand words, or fifty pages of the size and style of the JOURNAL (exclusive of tables).

II.—The Subject selected by the Council at a meeting held Nov. 24, 1893, for the Prize Essay of 1894, is

*"DISCIPLINE:—Its Importance to an Armed Force and the best means of Promoting and Maintaining it in the United States Army"*

III.—The gentlemen chosen by the Council to constitute the Board of Awards for the year 1894 are :

General JOHN GIBBON,  
General WAGER SWAYNE,  
Colonel F. V. GREENE.

WM. L. HASKIN,  
Secretary.

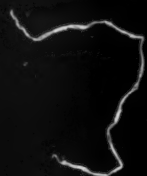
GOVERNOR'S ISLAND,  
January 1, 1894.

\*"All officers of the Army and Professors at the Military Academy shall be entitled to membership, *without ballot*, upon payment of the entrance fee. Ex-officers of the Regular Army of good standing and honorable record shall be eligible to full membership of the Institution *by ballot* of the Executive Council.

"Officers of the United States Navy or Marine Corps shall be entitled to membership of the Institution *without ballot*, upon payment of the entrance fee, but shall not be entitled to vote, nor be eligible to office.

"All persons not mentioned in the preceding sections, of honorable record and good standing, shall be eligible to Associate Membership *by a confirmative vote* of two-thirds of the members of the Executive Council present at any meeting. Associate Members shall be entitled to all the benefits of the Institution, including a share in its public discussions, but no Associate Member shall be entitled to vote or be eligible to office."





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## THE CORPS OF ENGINEERS.

BY BREVET BRIGADIER-GENERAL HENRY L. ABBOT, U. S. ARMY,  
COLONEL, CORPS OF ENGINEERS.

THE earliest records relative to what is now known as the Corps of Engineers must be sought among the incomplete documents which have come down to us from the period of the Revolution. The Journals of the Continental Congress indicate the gradual development of this arm of service under the peculiar conditions then existing. Thus, on June 16, 1775, the day before the battle of Bunker Hill, one chief engineer and two assistants were authorized "at the grand army," and one chief engineer and two assistants "in a separate department." These officers were commissioned in the grades of colonel and captain respectively. On January 16, 1776, it was resolved "That if General Washington think proper Col. R. Gridley be continued chief engineer in the army at Cambridge."

On December 27, 1776, General Washington was authorized, for a period of six months, "to raise and collect \* \* \* a corps of engineers and to establish their pay." The records are silent as to what action, if any, was taken on this resolution.

On July 8, 1777, it was resolved "That the treaty made by the Commissioners in France on the 13th day of February last, be confirmed as far as it respects the chevalier du Portail, monsieur de la Radiere, and monsieur du Gouvion; the first to be a colonel, the second a lieutenant-colonel, and the third a major of engineers." These officers were from the Royal Corps of Engineers in the French army, who with other educated military engineers had been drawn to this country by the war. From the lack of trained engineers in the native continental establishment, their assistance was highly appreciated; and for many years this foreign influence preponderated in the service.

Although the subject had previously attracted official attention, the first formal establishment of a Corps of Engineers by resolution of Congress dates from March 11, 1779. Among other provisions are the following: "That the engineers in the service of the United States shall be formed in a corps and styled the Corps of Engineers, and shall take rank and enjoy the same rights, honors and privileges with the other troops in the Continental establishment. That a Commandant of the Corps of Engineers shall be appointed by Congress, to whom their orders or those of the Commander-in-Chief shall be addressed, and such Commandant shall render to the Commander-in-Chief, and to the Board of War, an account of every matter relative to his department." On the 11th of May following, Brigadier-General du Portail was appointed Commandant of the Corps of Engineers.

The services of this revolutionary corps, including its companies of sappers and miners to which reference will soon be made, were important and honorable; numbers of its officers were brevetted by Congress, and its chief, on November 16, 1781, was promoted to the grade of major-general, "in consideration of his meritorious services, and particularly of his distinguished conduct in the siege of York, in the State of Virginia." The names of one brigadier-general, six colonels, eight lieutenant-colonels, three majors and ten captains are preserved on the records, and unquestionably the list is incomplete. In November, 1783, the corps was disbanded.

The next need for the services of military engineers occurred at the period of threatened European complications during the administration of Washington. On March 20, 1794, Congress authorized the President to fortify certain harbors on the coast, and there being no engineers in service he appointed temporarily several foreign born gentlemen, a number of whom had served in the war, to direct the work. On May 9, 1794, Congress passed an act raising for a term of three years (subsequently extended) a corps of artillerists and engineers, to be incorporated with the Corps of Artillery then in service. The new organization was stationed at West Point, and preliminary steps were then taken for forming a military school there. By the Act of April 27, 1798, a second regiment of artillerists and engineers was authorized, on the same footing as the earlier corps. On July 16, 1798, four "teachers of the arts and sciences" were authorized for the instruction of this organization; which was only discontinued by the Act of March 16, 1802, fixing the new military establishment.

This latter act authorized the President to organize and establish a Corps of Engineers, not to exceed 1 colonel, 1 lieutenant-colonel, 2 majors, 4 captains, 4 first lieutenants, 4 second lieutenants, and 4 cadets. It was provided that the said corps "shall be stationed at West Point, in the State of New York, and shall constitute a Military Academy; and the engineers, assistant engineers, and cadets of said corps, shall be subject at all times to do duty in such places and on such service as the President of the United States shall direct." This was the germ of the present Corps of Engineers. Most of the officers were soon dispersed along the coast on various military duties, but the superintendence and the responsibility for the successful operation of the Academy remained with the Corps until July 13, 1866, when the institution passed to the army at large, having attained a standard of excellence which needs no eulogy here.

In the earlier period of its organization the duties now pertaining to the Corps of Engineers were divided between two different branches, sometimes under a common head and at other times separately commanded. Space will be saved by considering this subdivision here.

Although a somewhat similar organization existed in the revolutionary war, no officers with the special functions of topographical engineers were provided for our armies until the early part of the war of 1812, when congress by Act of March 3, 1813, authorized as part of the General Staff, 8 topographical engineers with the brevet rank, pay and emoluments of majors of cavalry, and 8 assistants with the brevet rank, pay and emoluments of

captains of infantry. The law authorized these officers to be appointed, or transferred from the line without prejudice to their rank and promotion therein, but the full number seems never to have been selected; and at the conclusion of peace all but two majors were mustered out of service under the requirements of the Act of March 3, 1815. By Act of April 24, 1816, however, the Corps was reestablished, three topographical engineers and two assistants (still attached to the General Staff) being provided for each division of the army. This staff assignment continued until, by general order dated July 2, 1818, the officers were "arranged to the Engineer's Department, and \* \* \* made subject to the orders of the chief and commanding engineers." In the August following a separate topographical bureau was established in the War Department, under the immediate direction of the Secretary of War and the chief engineer. The work of this branch of the Engineer Department soon increased, calling for an average detail of about twenty-five officers of the line of the army and the employment, under the Act of April 30, 1824, of a still larger number of civil engineers. On June 21, 1831, the topographical bureau was constituted by the Secretary of War a distinct bureau of the War Department; and by Act of July 5, 1838, an independent Corps of Topographical Engineers was created by Congress.

By the Regulations of 1841, issued shortly after this separation, the engineering duties of the War Department were divided between the Corps of Engineers and the Corps of Topographical Engineers upon the following basis:

"The duties of the Engineer Corps comprise reconnoitering and surveying for military purposes, the selection of sites, and formation of plans, projects, and estimates for military defenses of every kind; the construction and repair of fortifications and defensible works of every description, whether temporary or permanent, the planning, laying out, and superintending all military works, defensive or offensive, of troops in the field, camp, or cantonment; the planning and construction of military bridges; the planning, laying out, and superintending military trenches, parallels, saps, mines, and other works of military attack and siege; the planning and executing such works of river or harbor improvement, including sea-walls, breakwaters, and light-houses, as may be assigned to it by law, or by the President of the United States; the general direction and management of disbursements for the above works, including purchases of sites and materials, hiring workmen, and making contracts for supplies of materials or workmanship; the collection, arrangement, and preservation of all reports, memoirs, estimates, plans, drawings, and models, relating to the several duties above enumerated; and the superintendence and inspection of the Military Academy.

"The duties of the [Topographical Engineer] Corps shall consist, in surveys for the defense of the frontier, inland and Atlantic, and of positions for fortifications; in reconnoissances of the country through which an army has to pass, or in which it has to operate; in the examination of all routes of communication by land or by water, both for supplies and military movements; in the construction of military roads and permanent bridges con-

nected with them, and, in the absence of an officer or officers of the Corps of Engineers, of military bridges, and of field-works, for the defense of encampments, fords, ferries, and bridges. For which purposes, officers of the Corps of Topographical Engineers shall always accompany armies in the field."

In the Regulations of 1857 and in subsequent editions, the duties of the two corps were defined jointly under a common heading, being practically a summation of those comprised in the Regulations of 1841 for both. In time of peace this modification of the Regulations introduced no change and no confusion, the Corps of Engineers retaining charge of the works for permanent defenses and of certain other public constructions, and the Corps of Topographical Engineers of the survey of the lakes, the exploration of the Western wilderness, and the demarcation of State and International boundaries,—while officers of both corps served upon works of river and harbor improvement, and upon the Coast Survey, the Light-house establishment and other special duties. At the outbreak of the Civil War however, it was soon discovered that engineer duties with armies in the field admitted of no advantageous division between different organizations. The officers were few in number, and the work was so onerous that practical consolidation on the staffs of commanding generals very soon resulted. Legal union, however, was desired by the officers themselves; and a petition to this effect, prepared by a joint committee representing both corps, was urgently favored by General McClellan, General Halleck and General Banks, and was approved by Mr. Stanton, the Secretary of War. A bill uniting the two corps was passed by the House of Representatives in 1862 and was favorably reported in the Senate, but received no action. Finally by Act of March 3, 1863, it was provided: "That the Corps of Topographical Engineers, as a distinct branch of the army, is hereby abolished, and from and after the passage of the Act, is merged into the Corps of Engineers which shall have the following organization: \* \* \* That the general officer provided by the first section of this act shall be selected from the Corps of Engineers as therein established; and that officers of all lower grades shall take rank according to their respective dates of commission in the existing corps of engineers or corps of topographical engineers."

The Corps of Engineers, as thus established, and as at present constituted, becomes therefore the heir to the honorable record of both the original corps.

The same Act of March 3, 1863, also inaugurated the present system of examinations for promotion in the army by providing that no engineer officer below the grade of field officer shall thereafter be promoted before having passed a satisfactory examination before a board of three engineers senior to him in rank; a like provision was also inserted for the Ordnance Department.

*The Engineer Department.*—Another organization should not be overlooked in tracing the history of the development of the service. The "Engineer Department" was established by order of the President shortly after the war of 1812, as a separate command with geographical limits co-extensive with those of the United States and embracing the Corps of Engineers, and such officers of topographical engineers and other arms of service



as might be attached thereto, and the Military Academy. Thus the chief engineer in early days exercised the functions of a department commander, being allowed an aide-de-camp, convening courts-martial, assigning officers to stations, granting leave of absence, and placing officers on "waiting orders." The headquarters which had been first established in New York, were transferred to Washington by order of the President on April 3, 1818. While this organization has nominally ceased to exist, its most essential functions are still vested in the chief of engineers as commandant of the Corps of Engineers.

*The Board of Engineers.*—On November 16, 1816, a "Board of Engineers for Fortifications" was constituted by the War Department to perform the following duties:

"It shall be the duties of the officers of this board to examine, in conjunction, all those positions where permanent works are or may be proposed to be erected. They shall select the proper sites for, and form the plans of all new works. Where fortifications have been commenced or are finished, they shall report how far the sites for such fortifications have been judiciously selected, or whether or not the works are adequate to the defense of the prospective positions, and they shall propose such alterations or additions to them as may be deemed necessary. \* \* \*

"The report and plans adopted by the board, shall be submitted with accurate estimates \* \* \* to the chief of the corps.

"The original reports and plans agreed upon by the board, as well as those reported by any member of it, shall be submitted by the Chief of the Corps of Engineers, with such remarks as he may deem proper, to the Secretary of War, for final adoption, and they shall be deposited in the secret bureau of the Department of War."

Under the Act of April 30, 1824, inaugurating works of internal improvement, a similar "Board of Engineers for Internal Improvement" was organized and continued until about the date of the segregation of the topographical engineers into a distinct bureau of the War Department; after which these functions seem to have devolved on special boards of greater or less permanency until, by authority of the Secretary of War, in an order issued on September 2, 1879, the functions of the "Board of Engineers for Fortifications," which had continued unchanged since 1816, were extended to include such works of river and harbor improvement, and other matters as may be referred to it by the chief of engineers. This organization, now officially designated "The Board of Engineers," continues to the present date.

*Engineer Troops.*—In view of the persistent efforts which have been made to class the engineer arm of service with the staff of the army, it should be noted that the Continental Congress established three companies of sappers and miners before it definitely constituted the Corps of Engineers. The dates of the resolutions effecting these objects are May 27, 1778, and March 11, 1779, respectively. Each of these three companies consisted of 1 captain, 3 lieutenants, 4 sergeants, 4 corporals and 60 privates. It appears that subsequently another company was added; for by the resolution of February 7, 1780, four captains were commissioned by

name. The duties assigned were the following: "These companies to be instructed in the fabrication of field works, as far as relates to the manual and mechanical part. Their business shall be to instruct the fatigue parties to do their duty with celerity and exactness, to repair injuries done to the works by the enemy's fire, and to prosecute works in the face of it. The commissioned officers to be skilled in the necessary branches of mathematics; the non-commissioned officers to write a good hand."

These companies of sappers and miners were assigned to the command of Brigadier-General du Portail, the first commandant of the Corps of Engineers, and served throughout the war, being disbanded with that corps in November, 1783. It is interesting to note that David Bushnell, "the father of submarine mining" was appointed to this body of troops on the recommendation of Governor Trumbull of Connecticut; he signed one of the last returns (now on file in the archives of the Department of State) at West Point on June 4, 1783, as "Captain Commanding."

The two regiments of Artillerists and Engineers, formed before the reorganization of the army in 1802, each contained 992 enlisted men; of the privates 672 were designated sappers and miners and 160 artificers; the remaining 160 were non-commissioned officers and musicians.

After the reorganization of 1802 a few enlisted engineer soldiers [one artificer and eighteen privates] were authorized to be enlisted by Section 3, Act of February 28, 1803. By the Act of April 29, 1812, it was enacted that there be attached to the Corps of Engineers "either from the troops now in service or by new enlistments, as the President of the United States may direct, 4 sergeants, 4 corporals, 1 teacher of music, 4 musicians, 19 artificers, and 62 men, which non-commissioned officers, musicians, artificers, and men, together with the artificers and men already belonging to the Corps of Engineers, shall be formed into a company to be styled a company of bombardiers, sappers and miners, and be officered from the Corps of Engineers, according as the commanding officer of that corps may, with the approbation of the President of the United States, direct."

From the 9th of June, 1814, this company served along the Niagara frontier, especially at Fort Erie and in the sortie from that work. It was disbanded by the Act of March 2, 1821, fixing the peace establishment of the United States, which retained no engineer troops.

At the outbreak of the Mexican war, Congress, by the Act of May 16, 1846, created a company of engineer soldiers which were "entitled to the same provisions, allowances and benefits in every respect as are allowed to the other troops constituting the present peace establishment." It was to "compose a part of the Corps of Engineers, and be officered by officers of that corps as at present organized." Its functions included "all the duties of sappers, miners and pontoniers"; and it was also to "aid in giving practical instructions in these branches at the Military Academy." The enlisted organization comprised 10 sergeants, 10 corporals, 2 musicians, and 78 privates.

This company joined the column of General Taylor on October 11, 1846, but was soon transferred to that of General Scott, where it took a gallant and distinguished part in all the battles from Vera Cruz to the City of Mexico.

In 1853 a detachment of 25 men assisted on the survey of the Northern Pacific railroad; in 1858 the company took part in the Utah expedition; in 1858, 1859 and 1860 a detachment of 30 men served with the troops in Oregon and Washington territory, taking part in the Wallen expedition to Salt Lake, the joint occupation of San Juan Island, and performing other important services.

In the feverish excitement preceding the Civil War the company was ordered to Washington to guard public property, and at the inauguration of President Lincoln it was selected to form his immediate body guard when proceeding to the Capitol. It formed part of the second relief expedition to Fort Pickens, sailing from New York on April 8, and after spending the summer at that fort, putting the works in a state of defense, returned to Washington in October 1861.

By the Acts of August 3 and August 6, 1861, three additional companies of engineer soldiers and 1 company of topographical engineer soldiers were added to the military establishment. They were to have "the same pay and rations, clothing, and other allowances, and to be entitled to the same benefits in every respect as the company created by the Act for the organization of a company of sappers and miners and pontoniers, approved May 15, 1846." The old company and each of the new companies was to be composed of 10 sergeants, 10 corporals, 2 musicians, 64 privates of the first class, and 64 privates of the second class,—in all 150 men. During the war no legal battalion organization existed, although the companies were so organized in orders; but by the Act of July 28, 1866, this defect was remedied by the addition of a sergeant-major and a quartermaster-sergeant, and the recognition of the detail of officers of engineers to act as adjutant and quartermaster, the battalion thus comprising a total of 752 enlisted men,—its present legally authorized strength.

These engineer companies after the return from Fort Pickens served throughout the Civil War with the Army of the Potomac. Space is lacking to detail their important and gallant services. The battalion was attached to the headquarters of the army, under orders of the chief engineer, and besides its special duties was often placed in the line of battle. Its officers were habitually detached, as needed, to serve temporarily on the staffs of generals commanding army corps and divisions. Its colors were officially authorized to bear the names of the following engagements: Vera Cruz, Mexico, 9 and 28 March, 1847; Cerro Gordo, 17 and 18 April, 1847; Contreras and Churubusco, 19 and 20 August, 1847; Molino del Rey, 8 September, 1847; Chapultepec and City of Mexico, 13 and 14 September, 1847; Yorktown, Va., 4 May, 1862; Fair Oaks, 31 May, 1862; Mechanicsville, 26 June, 1862; Gaines's Mill, 27 June, 1862; White Oak Swamp, 28 June, 1862; Malvern Hill, 1 July, 1862; Antietam, Md., 17 September, 1862; Fredericksburg, Va., 13 December, 1862; Chancellorsville, 4 May, 1863; Franklin Crossing, 5 June, 1863; Kelly's Ford and Rappahannock Station, 7 November, 1863; Wilderness, 5 and 6 May, 1864; Po River, 8 May, 1864; North Anna, 23 May, 1864; Cool Arbor, 3 June, 1864; Siege of Petersburg, June, 1864 to April, 1865.

Immediately after the close of the war the headquarters of the battalion

were established at Willet's Point, New York harbor, where has been gradually developed the present engineer school of application. All officers on assignment to the Corps of Engineers are attached for two or three years to one of the companies to acquire practical experience with troops, and to supplement their course of instruction in engineering received at the Military Academy. The captains commanding the companies under the supervision of the battalion commander act as instructors. The school was informally organized by General Humphreys on August 8, 1866, shortly after his appointment as Chief of Engineers; and it received the official recognition of the War Department on February 28, 1885.

One company of the battalion is usually stationed at West Point to aid in giving practical instructions in its special duties to the cadets of the Military Academy. For several years after the Civil War two companies were posted, one at San Francisco and the other at Jefferson Barracks, Mo., to be available for any military duty pertaining to their arm of service. When, under the changed conditions of the Indian problem, these detachments became unnecessary, they were discontinued.

Three times since the Civil War the Battalion of Engineers has been called upon, by order of the President, to join its comrades of the line of the army in aiding the civil authority to enforce the law. The first occasion was the suppression of illicit distilleries near the Brooklyn Navy Yard in December, 1869. The second was on similar duty in Brooklyn, in November, 1870, together with the occupation of the Army building to be in readiness to suppress anticipated rioting in New York City at the election of that month. The third was to aid in putting down the railroad riots in the summer of 1877; and it so happened that the only regular soldier who was wounded in this service was a private of Company A, Battalion of Engineers. Small detachments have repeatedly been made to assist officers of the Corps in reconnaissances, surveys, and other professional duties; and the battalion has frequently paraded with other troops on National occasions.

One important duty of the engineer troops in times of peace has always been to aid in perfecting the matériel pertaining to their arm of service in war. This has been done with marked success. The bridge equipage hastily organized for the Mexican war had proved unsatisfactory, and in 1858 experiments were begun to determine the best composition of trains for our service. These studies included trials with and the improvement of samples of those used in the European armies most experienced in the art of military bridge making. The matériel, except a few iron boats, was all fabricated by Company A at West Point, and the investigation was conducted in so thorough and systematic a manner by Lieut. Duane (since Chief of the Corps) that at the outbreak of war in 1861 every need of our armies operating in a theatre much obstructed by great rivers was perfectly met. After the Civil War similar duties were devolved upon the Battalion of Engineers in the development of a system of submarine mines for the defense of our harbors and rivers; and the matériel and methods now officially determined and established by the Chief of Engineers with the approval of the Secretary of War, have resulted from these studies. The duty of employing these weapons in war was on July 1, 1871, added to the

other military duties of engineer troops by Congress. The school of submarine mining forms a branch of the Engineer School of Application at Willet's Point; all officers of the Corps of Engineers are required, and officers of other arms of the service are allowed upon application to take this special course.

*War Record of the Corps of Engineers.*—Beside the military duties assigned to engineer troops, there are important professional functions which devolve upon engineer officers serving on the staff of generals commanding armies in the field; and in our service the command of volunteer troops, as well, has often devolved on officers of the Corps. In every war with a civilized power since the earliest history of our country these duties have been performed by them in a manner to merit and receive distinguished commendation; and in all these wars their blood has been shed on the field of honor. That this is no exaggeration is shown by the following list of officers who have been killed or mortally wounded in battle since the organization of the present Corps in 1802. All were graduates of the Military Academy:

Capt. and Bvt. Lieut.-Col. E. D. Wood, Sept. 17, 1814, Sortie from Fort Erie, U. C.

Capt. W. G. Williams, Sept. 21, 1846, Monterey, Mexico.

1st. Lieut. and Bvt. Captain W. H. Warner, Sept. 26, 1849, by Indians near Pitt River, Cal.

Captain J. W. Gunnison, Oct. 26, 1853, by Indians near Sevier Lake, Utah.

Maj.-Gen. I. I. Stevens, U. S. V., Sept. 1, 1862, Chantilly, Va.

Brig.-Gen. J. K. F. Mansfield, U. S. A., Sept. 18, 1862, Antietam, Md.

1st. Lieut. and Bvt. Col. J. L. K. Smith, Oct. 12, 1862, Corinth, Miss.

1st. Lieut. and Bvt. Major O. G. Wagner, April 21, 1863, Siege of Yorktown, Va.

Major and Bvt. Major-Gen. A. W. Whipple, May 7, 1863, Chancellorsville, Va.

Captain and Bvt. Col. C. E. Cross, June 5, 1863, Franklin's Crossing of Rappahannock River, Va.

1st Lieut. and Bvt. Col. P. H. O'Rorke, July 2, 1863, Gettysburg, Pa.

Captain and Bvt. Col. H. S. Putnam, July 18, 1863, Assault of Fort Wagner, S. C.

Captain and Bvt. Col. A. H. Dutton, June 5, 1864, Bermuda Hundred, Va.

Major and Bvt. Brig.-Gen. J. St. C. Morton, June 17, 1864, Petersburg, Va.

Brig.-Gen. U. S. A., J. B. McPherson, July 22, 1864, Atlanta, Ga.

1st Lieut. and Bvt. Maj. J. R. Meigs, Oct. 3, 1864, Harrisonburg, Va.

1st Lieut. Jacob E. Blake, Topographical Engineers, deserves to be mentioned in this list, although his death resulted from the accidental discharge of his own pistol on the field of Palo Alto after an act of the most conspicuous gallantry performed in the sight of both armies.

Very many of the officers of the Corps have been wounded in battle, some several times, but the list is too long for the space allotted to this paper.

During the war with Mexico 19 officers of the Corps of Engineers and 24 officers of the Corps of Topographical Engineers served actively in the field. One of them, Captain Williams, was killed, and sixteen wounds were divided among the others. Among those of this little band who subsequently, in the Civil War, reached high rank and distinction may be mentioned in order of seniority in their respective corps: Generals Mansfield, Robert E. Lee, Barnard, Beauregard, Isaac I. Stevens, Halleck, Tower, G. W. Smith, McClellan, Foster, Joseph E. Johnston, Emory, Fremont, Meade, Pope, Franklin, and T. J. Wood.

During the Civil War the officers of both Corps with few exceptions served with the armies in the field. Some were attached to the battalion, others were on the staffs of army and division commanders, and many held volunteer commissions in command of troops. This latter list would have been much larger at the beginning of the war had not the ground been taken at the War Department that their services in their own arm were too important to be spared in volunteer grades lower than that of brigadier-general.

It is a matter of record that 33 officers who either held or had held commissions in the Corps of Engineers, were appointed during this war general officers in command of troops. Of these, 3 became major-generals, and 3 brigadier-generals in the regular army; 15 were major-generals, and 12 were brigadier-generals of volunteers; 8 of the 33 commanded armies; and 10, army corps. At least 8 general officers in the Confederate armies had been officers of our Corps of Engineers, and among them were General Robert E. Lee and General Joseph E. Johnston.

*Peace Record of the Corps of Engineers.*—The limits of this paper forbid any attempt at details. The subject can hardly be covered more concisely than by the following extract from a letter of General Humphreys when Chief of Engineers, addressed to the Secretary of War in response to a circular of September 4, 1876, inviting suggestions upon the subjects before a commission for the reform and reorganization of the army. This paper, which is reproduced nearly verbatim in Hamersly's *Army Register* for 100 years, contains historical sketches of the two Corps compiled by Lieutenant-Colonel Casey, now Chief of Engineers. It involved much research and has been freely used in preparing the foregoing pages. General Humphreys writes:

"From the earliest period, the several organizations of engineers which we have had in our service, have invariably and exclusively made the surveys for, and the plans of, our sea-coast defenses, whether of a temporary character which were built up to 1818, or of the permanent character which have been since that time projected, and have superintended their construction and the disbursement of the funds appropriated by Congress for the same.

"Up to about 1831, its officers were to a great degree the repositories in this country, of that knowledge which was requisite for the purpose of making accurate surveys. The location and construction of the roads, canals, and bridges built for the development of the resources of the country, and the accurate methods of surveying, geodetic, topographic, and hydro-



graphic, now in use, are in a great measure due to the talents and labors of its officers.

"Almost all the great routes of internal communication in the interests of commerce and speedy transit, now in existence in the country, were first explored, located, and projected by officers of this Corps. The files of the bureau of the Corps in Washington, and the Congressional documents, are rich in reports upon the works of this character, that have been examined into under authority of law, by the Corps of Engineers.

"In the matter of the improvement of rivers and harbors, in the interest of commerce, the Corps of Engineers has had almost the exclusive control, and the information on this subject contained in reports of its officers, from the early years of this century to the present time, now filed in the Bureau of the Corps, is a monument to its labors and a most valuable collection of precedents to be used in the future prosecution of such works.

"The surveys, examinations, and constructions which have been made by officers of the Corps, have not been confined to such matters as are solely in charge of the War Department. From time to time the State Department, the Navy Department, the Treasury Department, and the Interior Department have employed its officers in the running of boundary lines, and the surveys for the maps necessary to be used in delicate diplomatic negotiations; in the surveys for, and the constructions of, dock-yards; the surveys for canal routes across the Isthmus of Panama; upon astronomical observations in the interest of science; in the surveys of the coasts, the planning and construction of light-houses and other fixed aids to navigation; the planning and construction of public buildings, of custom houses, post-offices, marine hospitals, etc.; and especially in the construction of the Capitol, the General Post Office, and the Washington Aqueduct in this city.

"Scarcely a branch of engineering, whether military or civil can be mentioned, that has not been improved and expanded by the study and labors of the officers of this Corps.

"It is difficult to enumerate all the duties which may have been, or which can be devolved on the Corps of Engineers in time of peace. As the duties generally are such as require familiarity with the sciences and arts, any duty which the Government needs performed which involves the application of this character of learning and comes within the professional training of the several members of the Corps, may be devolved by the President upon them."

The labors of the Corps of Engineers have been largely increased by the Act of August 11, 1888, which imposes upon the Secretary of War the duty of establishing harbor lines when in his judgment they are essential for the preservation and protection of harbors; also by the Acts of September 19, 1890, and of July 13, 1892, which contain important provisions relative to bridges, dumping, wrecks, and other obstructions to navigation.

*Present Organization of the Corps of Engineers.*—The headquarters of the Corps are now in Washington, where under the direction of the Secretary of War the engineer department, including its bureau, is commanded by its chief. His office is subdivided into five divisions. In general terms, the first includes fortification; the second, engineer troops and depots, with Corps orders, returns and personnel; the third, civil works of improve-



ment; the fourth, appropriations and disbursements; the fifth, surveys, maps and claims. Officers of the Corps, usually three in number, are detailed to take charge of these divisions.

A permanent board of engineers of not less than three members, usually high in rank, plans and revises projects of permanent fortification and works of river and harbor improvement, and considers such other matters as may be referred to it by the Chief. The latter submits all important reports, with his views thereon, to the Secretary of War without whose sanction no important work is undertaken.

The geographical limits of the United States are divided into districts usually about fifty in number, the military and civil engineerings works in each of which are in charge of an officer of experience in the corps. These officers execute the works, disburse the funds, and submit such projects and estimates as may be ordered.

Such of these districts as are in charge of officers below the grade of lieutenant-colonel are grouped in divisions, the number and extent of which are determined by the Chief of Engineers. At present there are five, each in charge of a Colonel of the Corps. Division engineers exercise care and oversight over the works in progress, inspect them at least once a year, and counsel, advise, and in case of emergency direct the district officers in matters pertaining to the engineering features of their works, reporting such action promptly to the Chief of the Corps. All papers connected with engineering project, plan and construction within his division pass through the office of the division engineer.

The engineering works of all districts are inspected annually by the chief of engineers or by the division engineers.

Officers of the Corps are detached under the Treasury Department to act as light-house engineers in each of the sixteen districts into which the country is divided; and others are detailed to serve as members and as engineer secretary of the Light-house Board.

Under the Act of June 11, 1878, an officer of the Corps, with two Engineer officers as assistants, is detailed as one of the three commissioners for the Government of the District of Columbia. Other officers are detached for service in connection with the Military Academy, and on special duties such, for example, as the demarcation of State and International boundaries.

The battalion is officered by details from the Corps, and other officers may be detailed to serve on the staffs of generals commanding departments.

From the above it will be seen that the duties of our Corps of Engineers combine the functions of the Corps du Génie, and of the Ponts et Chaussées in the French service; and in time of war include many of the functions of the Etat Major. That these duties are performed by an aggregate of 109 officers, not including the additional 2d lieutenants authorized by Act of May 17, 1886, sufficiently demonstrates the onerous nature of the services exacted from the Corps.

It may be added in conclusion that the term "staff corps" sometimes erroneously applied has always been repudiated by officers of the Corps of Engineers as a designation not in accordance with our statute law or

with the practice of other armies. The Corps forms no part of the staff of the army, for it in no case furnishes the means necessary for its subsistence, comfort, mobility, and action to any greater degree than does the artillery or cavalry. In most services it is termed a special arm, and in all services it is assigned a place in the line of battle. With us the honor of the right of the line is conceded by the regulations. This fact from the very derivation of the term is sufficient to justify the claim that the Corps belongs to "the line" of the army and that its officers are properly so classed except when specially detailed for staff duty.

In view of the general misapprehension prevailing as to the old 63d Article of War, now expunged from the list, some reference to its history and true import seems appropriate. The article was enacted by the Act of April 10, 1806, and read as follows:

"The functions of the engineers being generally confined to the most elevated branch of military science, they are not to assume, nor are they subject to be ordered on, any duty beyond the line of their immediate profession, except by the special order of the President of the United States; but they are to receive every mark of respect to which their rank in the army may entitle them respectively, and are liable to be transferred, at the discretion of the President, from one corps to another, regard being paid to rank."

This enactment was the outcome of a dispute which in 1803 arose between Colonel Williams, Commandant of the Corps of Engineers, and Captain Izard of the Artillery, whose company was stationed at West Point, upon a question connected with the command of the post.

The matter was referred to the Secretary of War, then Hon. H. Dearborn, who decided "that no officer, cadet, or soldier of the Corps of Engineers was subject to the orders of any officer of any other corps, but to the orders of the President only, or when in actual service to the orders of the commanding general, and that no officer of engineers should, under any circumstances, command any officer or troops, of any other corps, except by the special orders of the President."

This decision limiting command of engineer officers being in contravention of the then Articles of War, published by order of Congress on September 2, 1776, was received with great mortification and dissatisfaction by the officers of the Corps of Engineers, who felt themselves justly aggrieved thereby. No reply being received to a memorial on the subject addressed to the President, Mr. Jefferson, the whole Corps determined to resign their commissions; and Colonel Williams and Major Wadsworth, the only field officers then in the Corps, did actually resign.

As it was apparent that the military pride and sense of justice of the officers was severely wounded, the Secretary of War sanctioned a correspondence between General Wilkinson, the commanding general of the army, and Colonel Williams, inviting him to return to the command of the Corps, accompanied with a project of a General Order containing the principles, and substantially the expressions, subsequently embodied in the 63d article above quoted. Upon this basis the difficulty was settled. The article was in truth a compromise, accepted but never favored by the Corps of Engineers.

This article did, however, contrary to the usage of other nations, deprive engineer officers of the right of succession in command by virtue of seniority of commission, when different corps of the army joined to do duty together. Foreseeing the trouble which might arise in consequence, Congress wisely enacted in the organic acts raising the engineer troops now in service, the provision that these organizations "shall be entitled to the same provisions, allowances and benefits in every respect as are allowed to other troops constituting the present military peace establishment."

This legislation has settled the old standing controversy as to right of command in actual service with troops. The Battalion of Engineers has often served with other troops both of the army and navy, and always upon the basis thus laid down; which, moreover, was officially recognized by General Sheridan when commanding the army. In an indorsement dated July 7, 1885, he wrote: "When engineers are on duty with organized bodies of troops of their own corps, they *are or should be considered*, as *line officers*, and when a command of *engineer* troops happens to join or do duty with the troops of other corps, the engineer officers should be entitled to command, or to be commanded, according to seniority of rank.

"Paragraph 9 of the present Army Regulations, fixes the position in lines, of the different corps, including engineers on all occasions of parade and ceremony, and I believe it to be for the interest of the service, generally, that the engineer troops should in our service, as in that of other nations, be considered as of the line of the army,—an arm of service. \* \* \*

"In 1861, a battalion of engineer troops was formed, and with a strength varying from 200 to 750 enlisted men, has been continued in the permanent establishment. The Battalion of Engineers, comprising the companies stationed at Willet's Point and one company of engineer soldiers stationed at West Point, having an aggregate strength of 466 officers and men, is one of the most efficient bodies of troops in our service."

In the early part of its history the Chief of the Corps took an active part in the operation of armies in the field. The latest example was in the case of General Totten, who personally directed the duties of his arm of service in the siege of Vera Cruz. In one instance, that of General Alexander Macomb, the Chief of the Corps was promoted to the command of the army with the rank of Major-General.

The limited space allotted to this paper has precluded, for the most part, the mention of individual members of the Corps, although many of them have played an important part in the history of the country. The list on the following page of the successive commanders, however, should find a place:

## CHIEFS OF THE CORPS OF ENGINEERS, 1774 TO 1893.

| Name.                 | Rank.      | Title.  | Date of Appointment. | Where Appointed From. |
|-----------------------|------------|---|----------------------|-----------------------|
| Richard Gridley       | Colonel    | Chief Engineer                                    | June , 1775          | Mass.                 |
| Rufus Putnam          | "          | "   | Aug. 5, 1776         | "                     |
| Lewis du Portail      | "          | "   | July 22, 1777        | France                |
| Lewis du Portail      | Brig. Gen. | "   | Nov. 17, 1777        | "                     |
| Lewis du Portail      | Maj. Gen.  | "   | Nov. 16, 1781        | "                     |
| Stephen Rochefontaine | Lt. Col.   | Comdr. Corps of Artillerists and Engineers        | Feb. 26, 1795        | —                     |
| Henry Burbeck         | "          | Comdr. 1st Regt. Corps Artillerists and Engineers | May 7, 1798          | Mass.                 |
| Jonathan Williams     | "          | Principal Engineer                                | July 8, 1802         | Penn.                 |
| Jonathan Williams     | "          | Chief Engineer                                    | April 19, 1805       | "                     |
| Jonathan Williams     | Colonel    | "   | Feb. 23, 1808        | "                     |
| Joseph G. Swift       | "          | "   | July 31, 1812        | Mass.                 |
| Walker K. Armistead   | "          | "   | Nov. 12, 1818        | Va.                   |
| Alexander Macomb      | "          | "   | June 1, 1821         | New York              |
| Charles Gratiot       | "          | "   | May 28, 1828         | Mo. Ter.              |
| Joseph G. Totten      | "          | "   | Dec. 7, 1838         | Conn.                 |
| J. J. Abert           | "          | Chief Top. Engineer                               | July 7, 1838         | D. C.                 |
| Stephen H. Long       | "          | " " "   | Sept. 9, 1861        | New Hamp.             |
| Joseph G. Totten      | Brig. Gen. | Chief Engineer                                    | Mar. 3, 1863         | Conn.                 |
| Richard Delafield     | "          | "   | April 22, 1864       | New York              |
| Richard Delafield     | "          | Chief of Engineers                                | July 13, 1866        | "                     |
| Andrew A. Humphreys   | "          | "   | Aug. 8, 1866         | Penn.                 |
| Horatio G. Wright     | "          | "   | June 30, 1879        | Conn.                 |
| John Newton           | "          | "   | Mar. 6, 1884         | Va.                   |
| James C. Duane        | "          | "   | Oct. 11, 1886        | New York              |
| Thomas L. Casey       | "          | "   | July 6, 1888         | R. I.                 |

## THE SIXTH REGIMENT OF CAVALRY.

BY CAPTAIN WILLIAM H. CARTER, 6TH U. S. CAVALRY.

THE Sixth Regiment of Cavalry was organized as the Third Cavalry, under the President's proclamation of May 3, 1861; and the proclamation was confirmed by Act of Congress, July 29, 1861. It was provided that its officers should take rank from May 14, 1861.

The headquarters were ordered established at Pittsburg, Pa., and the following officers were appointed to constitute the commissioned force of the new regiment:

Colonel David Hunter, Lieutenant-Colonel William H. Emory, Majors D. H. Rucker and E. H. Wright.

Captains I. N. Moore, A. V. Kautz, A. W. Evans, Wm. S. Abert, D. McM. Gregg, J. H. Taylor, J. I. Gregg, John Savage, G. C. Cram, C. R. Lowell, J. S. Brisbin, and H. B. Hayes.

First Lieutenants J. K. Mizner, W. W. Averill, H. M. Enos, I. W. Claflin, S. H. Brown, B. T. Hutchins, H. T. McLean, Tattnell Paulding, Frederick Dodge, J. B. Johnson, J. F. Wade, M. H. Leavenworth.

Second Lieutenants J. W. Spangler, Peter McGrath, Hugh McQuade, and C. B. McLellan.

Major Rucker having declined, Major J. H. Carleton was appointed second major, to date from September 7, and Major L. A. Williams was on the same date appointed the junior major. Captain Moore having declined, Captain William P. Sanders was appointed.

The designation of the regiment was changed to "Sixth Cavalry," August 10, 1861, the Mounted Rifles becoming the Third Cavalry.

The regiment was recruited principally in Pennsylvania, Ohio, and western New York, under the supervision of Lieut.-Col. Emory, and on October 12, 1861, Companies B, D, E, F, G, H, I and K having been organized, the regiment was transferred to the camp of instruction east of the Capitol at Washington. The organization of Company A was completed October 15; a sufficient number of recruits arrived during the month to complete the organization of Company M; and on the 1st of November the band of fifteen members joined, and the instruction of the regiment was begun. Company C was organized December 23, 1861, thus completing the organization of all but one company, and on December 31 the regiment was ready for the field with 34 officers and 950 men.

Winter quarters were abandoned on March 10, 1862, when the regiment crossed Long Bridge and marched to Fairfax C. H., where it was assigned to General P. St. G. Cooke's command, and after making a reconnoissance to Centreville, Manassas and Bull Run, was embarked March 27, at Alexandria, for Fort Monroe, which it reached on the 30th.

The regiment, except one squadron, was equipped with sabres and pistols as light cavalry, and marched in advance of the Army of the Potomac to the position before Yorktown, where it remained until the evacuation.

The regiment participated in the Peninsula campaign as part of General Stoneman's command. It opened and participated in the battle of Williamsburg, after pursuing the enemy through Yorktown. Here it undertook a feat of arms seldom or never attempted by cavalry, mounted, and which was probably brought about by a misconception of orders, or faulty information regarding the garrison and works attacked. The daring counter-charge of Captain Sanders was the salvation of the rear of the command. The following extract is taken from the report of the regimental commander :

"I was ordered to make a detour through the woods and take a battery on the enemy's extreme left flank. I accordingly proceeded with the Sixth Cavalry through the woods indicated, and after going about half a mile at a trot, debouched upon an open but undulating ground in front of the enemy's line of fortifications. The ground was very heavy, and between the woods and the field works there was a deep ravine only passable by file. The ravine was about equi-distant from the woods and the works. It was passed and the regiment formed about one hundred yards from the fortifications. Lieutenant Madden with a platoon was sent to reconnoitre the gorge. This was during the time its occupants were engaged with Gibson's battery in front. Lieutenant Madden reported that the ditch and rampart would have to be surmounted before we could effect an entrance, and also that infantry was approaching on the near side of a wood which skirted the back of the fort. I saw three regiments advancing in line ; our position was critical, equally exposed to the guns of the fort and the advancing infantry. I determined to retire. Four of the squadrons and a portion of the fifth had already passed the ravine (it was belly deep to the horses in mud), when two squadrons of rebel cavalry rushed from the barracks in rear of the fort, and endeavored to cut off Captain Sanders' company. Captain Sanders wheeled his company about, charged and repelled the enemy with great gallantry. I cannot speak too highly of the officers and men on this occasion. Though every one felt that few would survive if the guns of the fort were turned upon us, not one showed the slightest concern. Captain Sanders showed great prudence and bravery in the timely manner in which he met the enemy, though taken at a disadvantage by superior numbers. I regret to report that Lieutenant McLellan was wounded in the leg by a shell while engaged."

The regiment formed part of the advanced guard of the Army of the Potomac, and was engaged May 9, 1862, in the action at Slatersville under General Stoneman, where Sanders again distinguished himself by repeatedly charging superior forces of the enemy's cavalry. May 11, the regiment again became sharply engaged at New Kent C. H.

May 24 it was in action at Mechanicsville, and two days later in the battle of Hanover Court House, the regiment camping on the battle-field until the morning of the 28th, when orders were received to burn the railroad bridge on the South Anna, near Wickham's farm. Colonel Wickham was laid up with a sabre wound received in the action with Sanders, and was captured and paroled. The destruction of the bridge and consequent railroad communication was accomplished during the day by a platoon under Lieutenant Kerin supported by the regiment. At 12 o'clock the same night

Lieutenant Kerin successfully destroyed the county bridge, about 200 yards above the railroad bridge.

Captain Cram destroyed a bridge which had been fired by Rush's Lancers on the 27th, but which they had failed to destroy because withdrawn prematurely. Orders arrived during the night to destroy the Virginia Central R. R. bridge over the North Anna, which was accomplished by Captain Abert's squadron, supported by Captain Kautz's.

June 13, 1862, General J. E. B. Stuart having succeeded in getting to the rear of the Federal army with a considerable force of cavalry, the Sixth was ordered in pursuit with part of the Fifth. Some active reconnoissance work took place, and Stuart's rear guard was found on the road to the White House. Orders being received to hold the position then occupied, the regiment halted until General Cooke arrived with his command. This raid made Stuart famous, and gave the opposing cavalries a lesson their leaders never forgot.

During the move from the Chickahominy to the James, the regiment retired by the way of York River. There was an accumulation of stores at White House landing which it was desired to move, and it became necessary to check the rebel cavalymen who were pushing in close pursuit of the retiring columns. The Sixth was placed with a platoon of artillery at the crossing of Black Creek, which it successfully defended against several attempts to force a passage. After dark, June 26, the stores having been removed or destroyed, the regiment retired to Williamsburg, marching all night. It remained about Yorktown, Hampton and vicinity until July 7, when it was embarked at Fort Monroe for Harrison's Landing, where the army had arrived after the seven days' fight.

Company L was organized and arrived at camp July 13, completing the regimental organization.

August 4, 1862, the regiment marched to Malvern Hill as part of Pleasanton's Brigade, and on the next day had a sharp engagement, losing four killed and a number wounded. During the evacuation of Harrison's Landing, August 18, it formed the rear guard to Charles City Court House.

The regiment embarked on transports at Yorktown, August 31, and landed at Alexandria, Va., September 2, 1862. For the next three months it was almost constantly in contact with the enemy, meeting him at Falls Church, Sugar Loaf Mountain, Middletown, Charleston, Va., the expedition to Leesburg, Waterford, Charleston again, Hillsboro, Philamont, Uniontown, Uppeville, Barber's Cross roads, Amosville and the Rappahannock, the regiment reaching Belle Plain, November 24, where it remained until December 12, when it marched to the vicinity of Fredericksburg.

The army was now crossing the Rappahannock below the town, and a pontoon bridge having been thrown over, a squadron was crossed, and made a reconnoissance towards the enemy's works, developing their infantry line and receiving the fire of a battery, with a loss of two men and eight horses wounded. The squadron was withdrawn and the result reported to General Burnside. The regiment was put in camp near Falmouth, December 13, 1862, where it remained until April 13, 1863.

The regiment was greatly hampered in its early service by the want of



proper arms for the kind of warfare it was dealing with. It was not until three days after the battle of Antietam that carbines were issued at Sharpsburg to all the men, and in the midst of an active campaign it was impossible to undertake any systematic instruction with the new arms. After four months of camp life near Falmouth, notwithstanding strenuous efforts to procure horses, the regiment resumed active work with nearly 300 men in the dismounted camp.

The regiment participated in the "Stoneman Raid" to the rear of the rebel army, which ended May 9, after swimming the Rappahannock. A picket detail under Lieutenants Carpenter and Wade reported on the 4th of May to General Buford, and accompanied him on his forced march to Gordonsville. During the raid Lieutenant Tupper with a detachment of ten men on a foraging expedition, captured the chief quartermaster of Stuart's cavalry in sight of one of their squadrons. It is doubtful if any service during the year was accompanied with greater hardships than were endured by men and horses during these few days from May 1st to 9th, 1863. The rain falling incessantly, swelled the streams and rendered the roads impassable.

Four days later the regiment encamped at Hartwood Church, and the regimental commander, assistant surgeon, and two men, were captured while passing from camp to General Buford's headquarters, a mile and a half distant.

On the 8th of June the regiment arrived near Beverly Ford on the Rappahannock, and crossed next day, participating in that famous cavalry combat with a loss of four officers and 63 men, killed and wounded and captured, out of 254 engaged. The regiment charged, losing Lieutenant Mad-den by a shell, and while reforming, the adjutant—Lieutenant Kerin—was captured. The regiment then supported Elder's horse-battery for several hours, part of the time under severe fire. It was then moved with the Second Cavalry to the extreme right, where severe loss occurred in charging the enemy to resist a flank attack. Lieutenant Ward was killed and Lieutenant Stoll badly wounded, both commanding squadrons. The latter was fired upon after he fell, and his men who tried to bear him away were shot down. This was one of the most severe cavalry actions of the war, and a loss of one-fourth its members is ample evidence of the courage and tenacity with which the Sixth fought until the line was withdrawn, and then the regiment was the last to withdraw and formed the rear-guard, where Lieutenant Tupper was specially mentioned for the skilful and deliberate manner with which he withdrew his squadron, the extreme rear guard, checking the enemy at every step as he retired.

While on the road to Snicker's Gap, the regiment had a brisk skirmish, June 17, near Benton's Mill; and again on the 21st, having joined General Gregg's command, it was engaged with the enemy, nearly all the cavalry of both armies fighting all day between Middleburg and Upperville. In the charge near the latter place Lieutenant McQuiston and five men were wounded. The regiment marched by way of Aldie and Leesburg to the Potomac, which was crossed at Edward's Ferry; thence to Point of Rocks and Emmitsburg, arriving July 2, 1863.

On July 3d, General Merritt ordered the regiment to Fairfield, Pa., on the road leading to Gettysburg from the northwest, to capture a wagon train, the rest of the brigade moving towards Gettysburg by way of Farmington. Fairfield was reached at noon, where two troops were detached to proceed along the base of the mountain, the regiment keeping the road to Gettysburg. About a mile from Fairfield the enemy's pickets were encountered and driven back to their supports, when another squadron was added to the skirmish line, and the enemy—the 7th Virginia—was driven back to the forks of the road from which their main body could be seen, consisting of about four regiments of cavalry. The regiment was close enough to hear the command "Draw Sabres" of the enemy, as they were formed for the charge. The two squadrons were in between post and rail fences, and could not form line or join those in the fields before they were charged by the rebel brigades under Generals Robertson and Jones. Caught in such a trap the men remained firm, firing and inflicting severe loss on the advancing column, until literally ridden down. Some escaped to the fields and made for the town, but the rebels were there first and Lieutenant Balder, who was ordered to surrender, called on the few men near him to follow and had nearly cut his way out when he fell mortally wounded. The squadron which was on the road near the mountain was also overpowered and hurled back to the town.

It was very unfortunate that the scattered squadrons were not withdrawn instantly from the front of such superior forces for more favorable ground. The regiment paid dearly for the error, losing, besides Lieutenant Balder killed, Major Starr and Lieutenants Tucker, Wood, and Chaffee, wounded; Captain Cram, Lieutenants Bould and Paulding, and Surgeons Forwood and Notson captured. The loss of men was 232 killed, wounded and captured, out of a total of less than 400.

The fight made at Fairfield by this small regiment against two of the crack brigades of Stuart's cavalry, which were endeavoring to get around the flank of our army to attack the trains, was one of the most gallant in its history and was really a part of the battle of Gettysburg. The efforts of these brigades were frustrated and their entire strength neutralized for the day, by the fierce onslaught of the small squadrons. The regiment was cut to pieces, but it fought so well that the squadrons were regarded as the advance of a large body of troops. The senior officer of these brigades was adversely criticised for allowing his command to be delayed by such an inferior force. Had the regiment not made the desperate stand, the two brigades of Virginians might have accomplished incalculable injury in the Federal rear, before sufficient force could have been gathered in their front. The small portion which escaped retreated to Emmitsburg, joined the brigade the next day, proceeded to Frederick City, Md., July 5, and to South Mountain and Williamsport, July 6, participating in the engagement there with the loss of one sergeant.

While making a reconnaissance to Funkstown, July 7, the regiment became heavily engaged with superior numbers, and lost Captain Claflin severely wounded and 85 men killed, wounded and missing. The regiment remained in contact with the enemy and was engaged, July 8 and 9, near Boonsboro, and again engaged near Funkstown, July 10.

The regiment had now lost all but three or four officers and a few men, and was ordered to report at Cavalry Corps Headquarters, and marched via Warrenton Junction to Germantown, arriving there August 8, 1863. The service of the regiment during the period between the action at Beverly Ford and the last affair at Funkstown was one of incessant marching and fighting, and although nearly decimated by the casualties of action, the brave little band hung on to Lee's army with a courageous tenacity, which remains to-day as one of the most cherished historical incidents of the regiment's existence.

The regiment did not leave Germantown until September 12, and next day crossed the Rappahannock and engaged in the fight at Brandy Station, driving the enemy through Culpeper. Here it remained for a month, when the rebels attacked and forced a retreat towards the Rappahannock. When near Brandy Station the regiment was ordered into position on the left of the road, and when the skirmish line on its left retired, it was in an exposed position which was promptly seen by the enemy, who attempted a flank attack with a column of cavalry. In withdrawing around a piece of thick pine woods where the corps skirmish line was placed, the regiment was fired into by the 1st New York (Harris') Cavalry, killing a sergeant and wounding Lieutenant Chaffee, Surgeon Forwood and three men. On the 14th the regiment reached Centreville, and while reconnoitring the enemy's position Lieutenant Nolan was wounded. The regiment remained near Brandy Station during the winter in huts constructed by themselves.

The regiment left winter quarters May 4, 1864, and reconnoitred Germania Ford, Mine Run, and U. S. Ford, returning to Chancellorsville in time to go with General Sheridan to Todd's Tavern, where, May 7, the cavalry corps were heavily engaged with cavalry and infantry.

The next day was spent in preparations for the raid towards Richmond which commenced May 9, 1864. The regiment marched on the Fredericksburg and Richmond Pike, crossing the North Anna after dark. The clouds of dust having attracted the attention of the enemy, they arrived during the night and opened on the corps headquarters at daylight with a battery, the regiment being near by and receiving a few shells without casualties. The march was resumed, the rebels continuing in pursuit and frequently attacking the rear guard. Reaching Beaver Dam Station, a train containing prisoners captured at the Wilderness was seized about 9 o'clock on the morning of the 10th, and destroyed with a large amount of muskets and small arms. The march was resumed and at 11 o'clock A. M., May 11, the enemy was encountered in front of Yellow Tavern, and a severe engagement took place resulting in the defeat of the rebels and the death of their gallant and famous leader—J. E. B. Stuart.

Crossing the Chickahominy at Meadow Bridge, May 12, the march continued towards Richmond until the outer works were reached, when the column turned to the left towards Mechanicsville Bridge. A shell placed in the road exploded as the regiment passed, killing one horse. The enemy now opened fire on the column, and the direction of the march was changed towards Mechanicsville. The enemy was in position on the road and fought stubbornly for two hours before he was driven away and a passage

over the river secured. Mechanicsville was reached at dark and the regiment went on picket.

Bottom's Bridge was destroyed May 13, and the day following the regiment was detached to Fort Monroe with orders for supplies to be sent to White House Landing. A march of fifty miles to Williamsburg was made the first day, and on the 15th Fort Monroe was reached, where the regiment remained until the 21st when it rejoined the cavalry corps at White House Landing, and proceeded to join the Army of the Potomac at Milford Station, May 24, 1864.

May 26, marched to Hanover town, crossing the Pamunkey at that point on a pontoon bridge next day, and on the 28th came upon the enemy and attacked him near Salem Church. Reached New Castle Ferry on the 29th and Old Church on the 30th, where the enemy was again engaged. Returning, the regiment reached Trevillian Station, June 10, and participated in the battle of that name, June 11.

The Cavalry Corps marched to White House Landing, leaving the Sixth at the crossing of the Mattaponi to await the arrival of detachments and take up the pontoon bridge, which was done and the corps rejoined on June 19. The next ten days was spent in marching, and on the 29th the enemy was again encountered near Dabney's Mill and a skirmish took place. The regiment crossed the James, August 1, and engaged in the action of Deep Bottom.

General Sheridan having been assigned to command the Middle Military Division, embracing the Shenandoah Valley, Troop L was ordered to duty as his escort, and the regiment embarked for Washington, and thence marched via Harper's Ferry and rejoined the Cavalry Corps near Berryville, August 20, 1864.

September 19, 1864, the regiment left Berryville at 3 o'clock A. M., towards Winchester, and at noon, as General Sheridan's escort, became engaged in the battle of that name. On the next day pursued the enemy to Strasburg and engaged in the fight of Fisher's Hill, driving the enemy all night and arriving at Woodstock next morning, where the day was spent in picking up stragglers and prisoners. The march up the Valley was resumed September 22, and at 10 o'clock A. M., the enemy was found posted on the south bank of the Shenandoah to dispute the crossing. The rebels were dislodged and the regiment proceeded to New Market and thence to Harrisonburg, where it remained.

October 7, the regiment marched down the Valley, and remained on the north side of Cedar Creek until October 13, when the battle of that name was fought. The rebels drove the regiment from its camp, but it was retaken before night and reoccupied. Captain Lowell was killed while leading the Regular Brigade to the charge in this action.

December 6, 1864, the regiment marched to Stephenson's Station, and formed part of General Merritt's command on his raid in Loudon Valley; and on the 19th it went with General Torbert's command on the raid to Gordonsville. Returning December 31, it went into winter camp at Kernstown.

February 27, 1865, the camp was broken up and the regiment proceeded

with the Cavalry Corps under General Sheridan, up the Valley through Strasburg, Woodstock and New Market, and arrived at Staunton, March 5; thence to the James River, and joined the Army of the Potomac near Petersburg, March 27, 1865. March 29, proceeded to Dinwiddie Court House. Here the Cavalry Corps engaged the enemy on the 30th, and drove them into their works at Five Forks, holding the position for three hours against repeated attacks and until the ammunition was exhausted. The enemy got in on the right flank of the regiment under cover of dense woods, and when the line was withdrawn for ammunition the rebels charged the flank capturing Lieutenant Nolan and 18 men. On March 31, their infantry having come up, the enemy attacked and drove the Cavalry Corps back to Dinwiddie. Next morning the regiment occupied the extreme right in the memorable battle of Five Forks, and connected with the 5th Corps, when it came into action during the afternoon, the regiment wheeling to the left and resting the right on the enemy's works. About 3 P. M., an advance was ordered which never ceased until sunset, when the battle was won.

The Cavalry Corps went in pursuit, April 2, and came up with the rebels and engaged them at 3 P. M., but they retreated. The pursuit was continued incessantly and with great loss to the enemy until April 6, when they were compelled to make a stand to save their trains. The Cavalry Corps pressed hard on their flank and awaited a favorable opportunity to capture the trains. Their infantry was forced to form, enabling the 6th Corps to arrive during the delay. The 3d Cavalry Division was now ordered to charge, the other two divisions supporting, and this, the battle of Sailor's Creek, resulted in the capture of about 10,000 rebels. During this action the regiment was ordered to take possession of some log huts. It is recorded in the regimental archives that the few men now left in the ranks hesitated, believing it was sure death; but Lieutenant McLellan, a veteran of the Old Army, faced them and said, "Men, let us die like soldiers." Every one of the little band rushed for the huts under a shower of bullets, and gained the cover with a loss of but three men wounded. The pursuit was pressed until 9 P. M. While trying to force a passage across the creek after dark, a shell burst in the midst of the little remnant bearing so bravely the standard of the Sixth, and wounded three, one of whom died next day. The march was resumed on the 7th, and on the 8th a rapid march was made to Appomattox Station where a charge was made resulting in important captures. April 9, 1865, the rebels made a desperate attack upon the cavalry at Clover Hill, but the arrival of infantry supports about 9 A. M., relieved the cavalry, which immediately proceeded at a gallop to the enemy's left with a view of charging upon that flank. On nearing the rebel lines a flag of truce was met requesting a cessation of hostilities as it had been decided to surrender. The surrender was announced at 4 P. M.

The cavalry was at once started for Petersburg and thence, after the grand review in Washington before the President, into camp at Frederick, Md., to reorganize and equip for duty on the distant frontier, where it was destined to pass the next quarter of a century.

The salient features of the regiment's history, during this most eventful

period of our nation's existence, have now been traced from the date of its first service in the Peninsula campaign, until formed for the last charge at Appomatox. The history of the regiment is that of the Regular Brigade, than which none brighter appears upon the records of the Army of the Potomac. The regiment was fortunate at the beginning of its career in having General Emory present as its lieutenant-colonel to organize it. The talent and courage of the squadron leaders, who so materially aided in establishing a reputation for the regiment, caused the early loss of these officers, who were soon selected for higher commands. Brave Sanders, a Southerner and West Pointer who remained loyal, was promoted to brigadier-general and was killed at the siege of Knoxville, Tenn. Lowell was killed while leading the brigade to the charge, he being then colonel of volunteers serving in the same brigade with his own Sixth. There were many officers of the regiment holding high commands, like Generals Hunter, Emory, Carleton, Kautz, the Greggs, Sanders and others, who rendered good service commensurate with the increased rank held by them, but the records contain many applications for and references to younger officers who were constantly detached for staff, recruiting and similar duties, who might have carved more enduring names for themselves in command of such excellent men as composed the ranks of the Sixth Cavalry.

Subsequent to the close of hostilities, the Adjutant-General's office not having given proper credit to the regiment for its services in battle, General Sheridan sent to the War Department the following communication, which is cherished as a manly and characteristic action on the part of that great leader: "I take this occasion to strongly urge that justice be done the Sixth Cavalry, and that the battles as given in the within order issued by me \* \* \* be credited to this regiment on the next Army Register, so that its record, or so much of it as is permitted in the Army Register, may be in a measure correct and complete. In the following battles the Sixth Cavalry fought under my personal supervision, viz.: Wilderness, Todd's Tavern, Furnaces, Spottsylvania Court House, Yellow Tavern, Meadow Bridge, Winchester, Fisher's Hill, Cedar Creek, Five Forks, Dinwiddie C. H., Clover Hill, Sailor's Creek and Appomatox Court House."

The records of casualties during the Rebellion show seven officers killed, 53 men killed in action and 53 other deaths; 122 wounded in action, and 17 by accident; 438 missing, most of these being captured at Fairfield and in other charges,—making a total of 689 enlisted men.

The regiment participated in the following actions during the war:

1862.

Williamsburg, May 4.  
Slatersville, May 9.  
New Kent C. H., May 11.  
New Bridge, May 20.  
Mechanicsville, May 24.  
Hanover C. H., May 27.  
Ashland, June 16.  
Black Creek, June 26.

Charlestown, September 28.  
Hillsboro, September 29.  
Waterford, October 1.  
Charlestown, October 8.  
Philamont, November 1.  
Uniontown, November 2.  
Upperville, November 3.  
Barber's Cross Roads, Nov. 5.



Malvern Hill, August 5.  
Falls Church, September 5.  
Sugar Loaf Mountain, Md., Sept. 13.  
Petersville, Md., Sept. 15.

Amosville, November 7 and 8.  
Sulphur Springs, November 17.  
Fredericksburg, December 12.

1863.

Beverly Ford, June 9.  
Benton's Mill, June 17.  
Middleburg, June 21.  
Upperville, June 21.  
Fairfield (Gettysburg), Pa., July 3.  
Williamsport, Md., July 6.  
Funkstown, Md., July 7.

Boonesboro, Md., July 8 and 9.  
Funkstown, Md., July 7.  
Brandy Station, September 13.  
Culpeper, October 11.  
Brandy Station, October 11.  
Robertson's Tavern, Nov. 27.  
Mine Run, November 28 and 29.

1864.

Wilderness, May 5 and 6.  
Todd's Tavern, May 7.  
Spottsylvania C. H., May 9.  
Yellow Tavern, May 11.  
Meadow Bridge, May 12.  
Salem Church, May 28.  
Old Church, May 30.

Trevillian Station, June 11-12.  
Dabney's Mill, June 29.  
Deep Bottom, August 1.  
Berryville, August 16.  
Winchester, September 19.  
Fisher's Hill, September 20.  
Cedar Creek, October 19.

1865.

Five Forks, March 30.  
Dinwiddie C. H., March 31.  
Five Forks, April 1.

Sailor's Creek, April 6.  
Appomatox Station, April 8.  
Clover Hill, April 9.

In October, 1865, the regiment left its camp near Frederick, Md., and proceeded via New York and New Orleans, to Austin, Texas, where camp was established November 29. The headquarters remained at Austin until August 24, 1868, when station was changed to Fort Richardson, Texas. The troops were distributed about the Department of Texas, at Forts Richardson, Belknap and Griffin, and Camps Austin, Sherman, Buffalo Springs and Sulphur Springs.

During the period from 1865 to 1871, while the regiment was stationed in Texas, the duties falling to the officers and men were of the most dangerous and varied kinds. After the close of the Rebellion the country was overrun with desperadoes and outlaws who were even worse than the hostile Comanches, and the officers and men were continually called upon to guard the courts of justice, to assist revenue officers, aid in executing convicted criminals, supervise elections, pursue outlaws and murderers, and in general to institute lawful proceedings where anarchy reigned. Many soldiers were assassinated for their devotion to law and order, and nothing but incessant vigilance and unflinching courage, prevented the guerrilla community from running the border counties of the State. The records for this period are very unsatisfactory, and important actions, in the light of to-day, are entirely omitted and remain only as traditions from the generation of war service men, who have almost entirely passed away from the regiment.



Parts of the regiment were engaged with Indians at Buffalo Springs, July 21, 1867; Fort Belknap, Texas, August 30, 1867; in the field, October 17, 1867; and at Paint Creek, Texas, March 5, 1868.

The desperadoes spoken of above, organized into bands of outlaws in many parts of Texas about this time, one of the most notorious being Lee's band. On March 7, 1868, Corporal Henhold, Troop D, left Sherman, Texas, with 13 enlisted men and some citizen guides, to break up this band. The pursuit carried the detachment to Read Creek swamp, where the band was effectually broken up by killing two and capturing five of their number. One troop marched more than a thousand miles in pursuit of outlaws during the last three months of 1868.

While scouting from Fort Richardson, Texas, in July, 1870, Captain McLellan with two officers, an A. A. surgeon, and detachments from Troops A, C, D, H, K and L, 6th Cavalry, came in contact with a war party of 250 warriors, and fought them on July 12 for about five hours. Captain McLellan's force numbered only 53 enlisted men, of whom two were killed and nine wounded. Eight horses were killed and 21 wounded. The Indians almost surrounded the command, fighting bravely at close range. Their loss was reported as 15 killed and many more wounded.

Other Indian engagements took place May 30, 1870; near Little Wichita River, October 5, and October 6, 1870; and on November 12, 1870.

During the early part of 1871 the regiment was ordered from Texas to the Department of the Missouri. The headquarters and troops which had assembled at Fort Richardson, Texas, left the post March 20, 1871, for Fort Sill, I. T., and soon after arrival began active scouting, which continued without intermission until the campaign of 1874-75 so completely paralyzed the hostile Indians, that they were compelled to abandon their belligerent attitude and flee from their familiar hiding places in the Pan Handle, to seek the protection of the agencies. A few of the troops were assigned to garrison in the Department, but most of the regiment eventually went into camp near Fort Hayes, Kansas, from which place the country in the vicinity of the Saline, Solomon and Republican rivers was kept thoroughly patrolled with scouting parties.

As it soon became evident that desultory scouting, and chasing war parties which had a good start, were equally unprofitable, expeditions were organized in Texas, New Mexico and Kansas, to pursue the Indians even to the cañons of the Tule and the bare, waterless plains of the Pan Handle.

Two troops which had been sent to Mississippi and Louisiana for reconstruction duty in January, 1872, returned in 1873, much to their gratification, and participated in the Indian scouting and subsequent campaign.

The regiment took part in the operations against the Cheyennes, Kiowas and Comanches in 1874, under Colonel N. A. Miles. This expedition was organized at Fort Dodge, Kansas, in August, two battalions of four troops each, under Majors Compton and Biddle, representing the Sixth.

As the command advanced the Indians retreated to the south, concentrating near Red River, Texas. They were rapidly pursued and were overtaken near the mouth of the Tule, where an engagement took place August 30, 1874, with about 600 warriors. The hostiles occupied a line of bluffs,

and, notwithstanding the Indians displayed their usual dash and courage in the first attack, the command was rapidly deployed, the Indians charged and were driven over the bluffs, thence through deep and precipitous cañons, past their burning villages and out on to the Staked Plains. The regiment was commended in orders for its dash and intrepidity in this engagement.

Two parties were sent from the battle-field to Camp Supply, I. T., with dispatches, one of which was under the charge of Sergeant Z. T. Woodall, of Troop I, 6th Cavalry. This one was attacked by Indians and the following extract from a letter, written by General Miles, tells the story of its remarkable fight.

"From early morning till dark, outnumbered twenty-five to one, under an almost constant fire and at such short range that they sometimes used their pistols, retaining the last charge to prevent capture and torture, this little party of five defended their lives and the person of their dying comrade, without food and their only drink the rain water that collected in a pool mingled with their own blood. There is no doubt that they killed more than double their number, besides those that were wounded. The Indians abandoned the attack at dark on the 12th. The simple recital of their deeds and the mention of the odds against which they fought, how the wounded defended the dying, and the dying aided the wounded by exposure to fresh wounds after the power of action was gone, these alone present a scene of cool courage, heroism and self-sacrifice, which duty as well as inclination prompt us to recognize, but which we cannot fitly honor."

Lieutenant Frank West with 20 men was sent with Captain Lyman, 5th Infantry, and his company, from camp with a wagon train to meet the outcoming train and bring supplies to the front. The train was found September 7, when the detachment was increased by seven men coming out to join the regiment. The stores were transferred in a violent storm, and the return march begun, when the Indians appeared and killed and scalped a teamster who had wandered off a short distance. The train was followed, and on the 9th the attack of the Indians, about 250 in number, commenced. The train was corralled a mile or more north of the Washita River for the ensuing fight, which lasted four days. The train had just emerged from a ravine when the Indians charged the rear fiercely, riding to within about 100 yards and shooting down Lieutenant Lewis and Sergeant Armour, 5th Infantry. A scout was sent through to Camp Supply, being chased on the way, and returned with Troop K, 6th Cavalry, with medical assistance for the wounded, who had endured great suffering during the four days fighting and exposure without food or water.

On November 8, 1874, Troop D (Lieut. Overton), with Company D, 5th Infantry, all under Lieutenant Baldwin, fought a band of Indians from 9 A. M., until 2 P. M., near the headwaters of McLellan's fork of Red River. Major Compton with Troop H went to the assistance of these troops but the fighting had ceased before he arrived. Two captive white girls, Julia and Adelaide Germain, were rescued during this engagement. Their parents and an older brother and sister were killed near the Smoky Hill River, and these two girls with two other sisters were carried into captivity.

Horse thieves took advantage of the unsettled condition of affairs to ply their nefarious trade, and Lieutenant Hanna with ten men of Troop B was

sent from Fort Dodge on November 4th in pursuit of a band. It was overtaken on the 9th and in the fight which lasted two hours, Private Skelton was wounded, Lieutenant Hanna's horse killed, two thieves wounded and twelve horses and mules recovered.

On December 1st, Captain Chaffee made a night march to surprise a party of Indians reported to be on a branch of the North fork of Red River, but the Indians received warning and decamped in great haste. First Sergeant Ryan, Troop I, with a detachment, pursued and overtook them at daylight, December 2, attacked and routed them, capturing their ponies, about 70 in number, which were mostly saddled and packed.

The campaign was continued far into the winter, the last movement on the Staked Plains being executed in intensely cold weather, the thermometer registering at times 25 degrees below zero, and "Northers" prevailing almost incessantly. The Indians were fought in nine engagements, and were so harassed during this campaign that they were unable to commit their usual depredations. After continuous pursuit they went into the agencies and surrendered in a greatly impoverished condition, and have never regained their old war spirit.

Peace prevailed until spring, but on April 6, 1875, Troop M was engaged near the Cheyenne Agency from 3 P. M. until dark with about 150 Cheyennes. Nine Indians were killed, four soldiers wounded, and nine troop horses killed or wounded.

A party of Cheyennes broke north, and having been seen crossing the railroad, Lieutenant Austin Henely with 40 men of Troop H, went by rail to Fort Wallace, Kansas, and left there April 19, 1875, to strike the trail southeast of the post. He pursued rapidly until April 23, when he overtook the band at Sappa Creek, Kansas. The Indians made a stand and they were fought at close quarters to the bitter end. Twenty-seven Indians were killed; 134 ponies, with all their camp property and arms were captured. Sergeant Papier and Private Theims, of Troop H, were killed.

After a brief space of active scouting again, the regiment proceeded to relieve the Fifth Cavalry in Arizona, the order having been issued the preceding year and suspended on account of the Indian troubles. The first half of the regiment, with the headquarters and band, assembled during the early part of May, and marched under the command of Captain McLellan from Fort Lyon, Colorado. The 5th Cavalry moved from Arizona at the same time, and the two commands met at Santa Fé, N. M., where horses were exchanged and old acquaintance renewed. As soon as these troops had reached their respective Departments, the remaining troops of the outgoing regiments were relieved, and a similar meeting and exchange of horses was made at Fort Union, N. M.

Upon arrival in the Department of Arizona, the troops were widely scattered. Headquarters and Troop B went to Camp Lowell; A and D to Camp Apache; C, G and M, to Camp Grant; E and I to Camp Verde; H to Camp Bowie; L to Camp San Carlos; K to Camp McDowell, and F to Fort Whipple. The troops marched an average of 1064 miles from their old stations to the new.

Comparative quiet reigned in Arizona during the summer while the regi-

ment was marching in, but it was not long before marauding bands of Apaches commenced their usual deviltry, which continued at intervals during all the years the regiment was stationed there.

On January 9, 1876, Troops A and D, while in garrison at Camp Apache, were engaged with the White Mountain Apaches for three hours. For some fancied wrong the Indians got into the rocks and timber and opened fire on the post. One Indian was killed, five captured, and the others driven away.

During the summer of 1876, while the great Sioux war was progressing in the north, the entire regiment was called to the field to put down the Chiricahua Apaches, and later to assist in removing them to San Carlos Agency. Before the arrival of the regiment at the scene of operations several parties were sent out to stop the numerous raids. Lieutenant Henely went from Camp Bowie with a detachment and had an engagement April 10, 1876, and subsequently assisted about 200 friendly Chiricahuas to the agency adjoining the post in Apache Pass. The regiment arrived and during June was sent around the Indian reservation to drive in the Indians, but many of the worst had fled to the rocky fastnesses of the Mexican mountain peaks, and remained a thorn in the side of the army and the settlers for more than ten years.

Such Indians as were willing were moved to San Carlos Agency, the troops sent back to their stations, and soon the dangerous country was filled with daring prospectors seeking the fine mines located thereon. Many of these hardy miners have paid with their lives for the privilege of prospecting that section.

Encounters with the Indians occurred August 15, and October 4, 1876, and January 9, 1877, and they became so daring in Southern Arizona that another company of scouts was organized under Lieutenant John A. Rucker than whom no officer in the army was better fitted for the work before him. In command of a detachment of Troops H and L, and his scouts, he overtook and defeated a band of Chiricahua Indians in the Leitendorf Mountains, N. M., on January 9, 1877. Ten Indians were killed and one boy captured, and from the evidences left behind a number of Indians are believed to have been injured. The entire herd, arms and ammunition were captured, together with a large amount of stolen goods and about \$1200 in Mexican silver. The hostile strength was estimated at fifty warriors.

May 29, 1877, Lieutenant West with a detachment was attacked near Camp Bowie, Arizona.

About the 20th of August, several parties of renegades crossed the Mexican border at various places and, coming together by preconcerted arrangement, proceeded to the San Carlos reservation. Lieutenant Hanna started on a trail near Camp Huachuca, and when near Camp Bowie learned that another party had killed the mail rider east of Bowie. Rucker joined Hanna, and the two companies of scouts and cavalry detachments followed the trail which constantly grew larger. The renegades led them through a very rough country where some of the men became nearly insane for want of water. The trail turned into the San Carlos reservation and the commands stopped at Camp Thomas to telegraph for orders before going on the reservation. Before an answer came the renegades had succeeded in creating

an outbreak. The Warm Spring Indians broke away from San Carlos, and were pursued by Captain Tupper with Troop G and detachments from B, H, L and M,—Lieutenants Hanna and Rucker with their companies of scouts joined him. The runaways were overtaken, and in a scattered and running fight on September 9 and 10, 12 Indians were killed and 13 wounded.

Other encounters took place December 13 and 18, 1877, and January 7 and April 5, 1878.

The department commander finally decided to put a stop to the incessant raiding of small parties from Mexico, and Lieutenants Rucker and Carter with their companies of scouts were ordered to establish a supply camp near the border and to remain there patrolling. Lieutenant Henely joined the camp with a company of scouts, and a few days later the regiment was horrified by the news of his death by drowning, and that of Rucker while trying to save his friend and classmate, at their camp, by a sudden rush of waters resulting from a cloud burst. Henely was being carried away by the torrent, when Rucker boldly plunged his horse in the stream to save him, but the raging waters carried him down also. The loss of these officers, especially of Rucker, who was better known to the border people than any other officer of the regiment, was universally lamented.

Indian fights in which the regiment was represented took place September 17 and from September 20 to 30, 1878; September 29 and October 27, 1879; and April 7, 1880.

Captain C. B. McLellan with Troop L, Lieutenant Touey's detachment, Troop C, and Gatewood's scouts, while on a scout in New Mexico came upon a battalion of the 9th Cavalry engaged with Victoria's Apaches at a serious disadvantage, and succeeded in dislodging the Indians and relieving the 9th. This fight occurred April 9, 1880, in the San Andreas Mountains. During the few weeks succeeding this event, Victoria raided incessantly, and on May 7, 1880, attempted to get in to San Carlos with 50 warriors, but was met by Capt. Adam Kramer with part of his troop (E) and Lieutenant Blockson with part of his scouts, on Ash Creek, where a fight ensued, resulting in driving Victoria away, but with the loss of an old and valuable non-commissioned officer,—Sergeant Griffin of Troop E,—killed, and one scout wounded. Several commands went after Victoria but he escaped and laid waste New Mexico to such an extent that nearly all the regiment was engaged during the summer in constant scouting, ending in an expedition to Sonora and Chihuahua, under General Carr, which was participated in by most of the regiment and several companies of scouts. Victoria was driven into the hands of a Mexican column in October and his band almost destroyed. During September this band of Indians captured the overland stage near Fort Cummings, N. M., and killed the occupants, including the young son of Captain Madden, who was coming out from an eastern college to spend his vacation with the regiment.

During August, 1881, the White Mountain Apaches, hitherto very friendly, began to show signs of disaffection, brought about by the machinations of a medicine man named Nackaydetklinne, and General Carr was ordered to arrest him. He marched from Fort Apache with Troops D and E, and Company A, Indian Scouts, to Cibicu Creek, and arrested the fanatic

in the midst of his people, who were informed that having refused obedience to the agent, it was necessary to take their medicine man to the fort, and that his family would be permitted to accompany him but that any attempt at rescue would be resisted. The battalion marched about a mile down the creek, and while preparing to bivouac there was some excitement amongst the scouts and other Indians who had followed the rear guard to camp, and though every effort was made to prevent a conflict, the Indians, including the mutinous scouts, fired on the troops and a hand-to-hand conflict ensued. The Indians were driven from the immediate vicinity, notwithstanding their numerical strength was about twice that of the soldiers, but continued for several hours to fire from the surrounding hills. The battalion lost Captain Hentig and six men killed, two wounded, and 42 horses; the medicine man was killed. The next day the command returned to Fort Apache in time to save that post, which was attacked September 1st. At the same time all the roads were scoured by war parties, and the mail rider, three soldiers and a number of citizens were killed. This outbreak involved the whole regiment in a short campaign which compelled the White Mountain Apaches to surrender at the agencies.

The withdrawal of troops from the Mexican border to participate in driving in these Indians, left the way open and the Chiricahuas broke from the reservation and fled south. They were rapidly pursued by two troops and overtaken near Cedar Springs, Arizona, and fought for more than five hours, with a loss of one sergeant killed and three privates wounded. The Indians fled from the strong position held by them during the night, and eventually reached Mexico.

The ensuing year was one of much hard scouting with but little reward, until April, 1882. The Chiricahaus then made one of their periodical breaks from the reservation, and started for their old haunts in Mexico. Two troops started from Fort Thomas in pursuit, and on the second day, April 20, Lieutenant Sands with a few men overtook the Indians and exchanged a few shots. Captain Tupper, with Troops G and M, and Indian scouts, caught up with the band near the Mexican line, and fought, April 28, about 150 Indians who had taken refuge in the rocks, killing 17 Indians and 15 horses and mules, and capturing 75 horses and mules, with a loss of one trooper killed and two wounded. The troops had to withdraw at night to obtain water, and the Indians fled southward. The command crossed into Mexico, and the flight of the Indians having been discovered by a regiment of Mexican infantry on the march, an ambushade was quickly prepared and when the Indians found themselves entrapped, a hand-to-hand conflict ensued resulting in the annihilation of the savages.

During July, 1882, another outbreak occurred from the San Carlos Agency, the band going north murdering settlers instead of following the usual route to Mexico. Active pursuit resulted in overtaking the Indians, some troops of the 3d Cavalry, and E, I and K, 6th Cavalry, coming together from different posts on the hot trail just as the Indians were sighted. The fight occurred at the Big Dry Wash of Chevelon's Fork, A. T., and resulted in the capture of 60 horses and mules, 50 saddles, and much camp property. Sixteen Indians were killed and many wounded.



During the remainder of 1882 and 1883, the regiment was scouting almost incessantly because of the raids from Mexico by small parties of Chiricahuas. During March, 1883, General Crook took Troop I under Captain Chaffee, on his famous expedition to the Sierra Madres in Mexico, returning in July, having marched 900 miles, and bringing in the head chiefs and about 400 hostiles.

The regiment was relieved from duty in Arizona during June, 1884, and exchanged stations, marching, with the Fourth Cavalry in New Mexico, two troops going to Colorado.

During the nine years' service in Arizona the hardest work was the incessant detachment duty, which was necessary to such an extent that troops rarely if ever took the field over 35 strong. The average marching of troop, as shown by the returns for nine years, was 6419 miles. The greatest number of miles marched was 8514 by Troop A. These marches are of organizations and of course do not include the long trips with mails, paymasters, Indian scout companies, etc. Scouting for Apaches has always been attended with more labors and difficulties than honors or successes.

The command of the companies of Indian scouts usually devolved upon the young lieutenants of the regiment, and while developing self-reliance, coolness and woodcraft, the incessant exposure resulted disastrously to many of them.

Two of these young officers deserve special mention—Lieutenant John A. Rucker, whose station was always "In the field," and who during his service with scouts followed nearly every hostile trail between the Gila River and the Sierra Madres in Mexico within a few hours after it was made, and who finally laid down his young life in a seething mountain torrent in which no being could live for a moment, in an unsuccessful effort to save the life of his friend and classmate, Henely.

The other,—Lieutenant Charles B. Gatewood,—who entered upon service with the Apaches within a few months after joining the regiment. He saw much service during the Victoria and other Apache outbreaks, taking part in several engagements in New Mexico. He was commended later by the Major-General commanding the Army, for his conduct in the surprise and defeat of Chato and Bonito, and the rescue of five captives near the headwaters of the Bavispe River, in the Sierra Madres, Sonora, Mexico. An act which has made him known throughout the army and the country generally, and which Ned Casey probably had in mind when he was so foully murdered by the Sioux, is thus mentioned in the recent general order of the War Department commending him "For bravery in boldly and alone riding into Geronimo's camp of hostile Apache Indians in Arizona, and demanding their surrender."

Upon arrival in New Mexico, the headquarters were located at Fort Bayard, some troops going to Forts Wingate, Stanton, Cummings, N. M., and Lewis, Colorado. Captain H. P. Perrine, with Troops B and F which went to Colorado, took the field from Fort Lewis in pursuit of hostile Utes, and engaged them, July 15, 1885, at Wormington Cañon. One packer and one volunteer were killed.

The regiment settled down to garrison life, building quarters, putting in



water works, and improving the posts generally, which continued until the spring of 1885, when nearly all the troops were hurried to the field in May, to head off their old enemies, the Arizona Apaches, who broke away from Fort Apache and fled towards Mexico. Active but unsuccessful efforts were made to overhaul these renegades before they reached Mexico. Troop A followed the Indians about 500 miles into Mexico. The troops were placed in camp at the various water holes along the border, and patrols were kept out watching all the border country for hundreds of miles. This lonely and very disagreeable duty of watching for "signs," continued for more than a year, and the fact that very few Indians succeeded in getting back into the settled country, indicates great vigilance. The troops returned to their posts during June and July of 1886, but made frequent scouts subsequently after these same renegades.

Aside from frequent scouts on the Navajo reservation and vicinity to keep peace between citizens and Indians, the troops were not called into the field for any large operations until danger threatened among the far away Sioux in 1890. The scattered condition of the army at that time necessitated the gathering of troops from almost every department, and included the Sixth Cavalry, which was transferred by rail from New Mexico to South Dakota, arriving at Rapid City, December 9, 1890.

On January 1st the regiment was camped near the mouth of Wounded Knee Creek, and the pickets reported firing early in the afternoon, several miles away on White River. Troop K of the third battalion had not yet joined, and, suspecting that the Indians had attacked it, "boots and saddles" was sounded, and Major Tupper with his two remaining troops, F and I, proceeded at a gallop through the snow, guided only by the sound of the firing which came to the ears of the advanced guard. Arriving on the bluffs overlooking White River, Troop K, under Captain Kerr, was seen with train corralled and the attacking Indians in full view. Although the horses were blown with their run for four or five miles in the snow, the skirmish line was formed at a charge and the line pushed rapidly across the half frozen river between K Troop and the Indians, who, notwithstanding their taunting cries of "come on," gave way all along their line, and retreated in the direction of the main village.

Some of these Indians who had crawled up close to K Troop, were cut off, but by abandoning their ponies they managed to crawl away between the lines under a heavy fire, and succeeded in reaching the bluffs, where they were subsequently found wounded and were killed by the scouts. The result of this attack was particularly gratifying, because the Indians were seeking revenge for their losses at General Forsyth's hands, and found General Carr's troops so fully prepared to give it to them that they returned to the hostile village and acknowledged defeat and a loss of nine warriors. The other troops directed to take part in this affair arrived under General Carr so promptly on the flank of the Indians that if they had made a stand for a few minutes their escape would have been a very difficult matter.

This was the only fight participated in by the regiment during the campaign. Soon afterward the Indians formally surrendered and half the regiment remained with them at Pine Ridge Agency until February. While

en route to their new posts in the vicinity of the Indian reservations, the men and horses suffered greatly from exposure in very severe weather.

The regiment is now, as it has been ever since the Rebellion, "standing to horse" near an Indian reservation ready to participate in quelling disturbances after the Indian Bureau fails.

In following a cavalry regiment for thirty years by means of its retained records, the trail is often found dim and rough, sometimes completely obliterated. It would be impossible in so brief a sketch to name all the heroes and heroic deeds that these years have developed. The names of the officers participating in actions even, cannot be given because so many records have been lost in battle and flood. To illustrate the difficulties surrounding this labor it is only necessary to quote from one morning report where the naive remark is duly entered, that "the company clerk was captured yesterday with the muster roll in his saddle pocket." Many incidents of great interest have been brought to light through the kindly offices of the Sixth Cavalry Association, an organization of veterans who followed the fortunes of the regiment during the war, and who still meet annually to keep alive the friendships and memories of those eventful days.

This sketch is confined as nearly as possible to things historical, but the search for facts has developed a perfect mine of interesting incidents and regimental tales which have no place here. The pressure of other duties has made it impossible for the writer to do full justice to the subject, and it was only the fear that it would be entirely neglected by those more competent that caused the preparation of this imperfect narrative.

## THE NINTH REGIMENT OF INFANTRY.

BY CAPTAIN E. B. ROBERTSON, 9TH U. S. INFANTRY.

UNDER the authority granted the President by the Act of July 16, 1798, to raise twelve additional regiments of infantry, the 9th Infantry first came into existence in the Army of the United States in January, 1799, with Josiah Carville Hall, of Maryland, as Lieutenant Colonel Commandant. All of the officers were appointed from Maryland, and an order of the War Department of January 5, 1800, directed that the regiment be recruited in that State. All of the officers were appointed and confirmed by the Senate, but it is probable that but few enlistments were made, as the Act of February 20, 1800, suspended enlistments for the new regiments. The Act of May 14, 1800, authorized the President to discharge them, and under this authority the 9th Infantry was disbanded June 15, 1800.

Under the Act of January 11, 1812, the 9th Infantry was again organized in March, 1812, with Simon Learned, of Massachusetts, as colonel. The regiment was raised in Massachusetts, and though a part of the regular army, was accredited to that State. It took an active part in the War of 1812, on the northern border, being present at the battle of Niagara Falls, Lundy's Lane, and other actions in that vicinity.

In the reorganization of the army under the act of March 3, 1815, this regiment was disbanded and no regiment bearing the designation existed until April, 1847, when the 9th Infantry was again organized, it being one of the few regiments authorized by the Act of February 11, 1847. The first colonel was Trueman B. Ransom, of Vermont, who was killed in the assault upon Chapultepec. He was succeeded by Col. Jones M. Withers, who resigned May 23, 1848, and he, by Col. Henry L. Webb. The regiment rendered efficient service in the series of actions in the immediate vicinity of and ending with the capture of the City of Mexico. At Contreras, Churubusco, San Antonio, Molino del Rey and Chapultepec it took a distinguished part. At Chapultepec it was in support of the storming force, but joined with it and became part of it in the assault on the citadel. Sixteen officers and eleven enlisted men of the regiment were mentioned by name in the report of Major-General Pillow for meritorious conduct in this battle, among the former being General R. C. Drum, then a second lieutenant. In August, 1848, the regiment was again disbanded.

Under authority of the Act of March 3, 1855, the 9th Infantry was again organized. Lieutenant-Colonel George Wright, 4th Infantry, was appointed colonel; Captain Silas Casey, 2d Infantry, lieutenant-colonel; and Captains Edward J. Steptoe, 3d Artillery, and Robert S. Garnett, 1st Cavalry, majors. The headquarters of the regiment were established at Fortress Monroe, Va., March 26, 1855, and recruiting rendezvous were opened by officers of the regiment in Maine, Connecticut, New York, New Jersey, Pennsylvania, Maryland, Virginia, Ohio and Tennessee. Companies A, F and G, were organized in May. B, H and I in June, D and K in August, E in September, and C in November, 1855. In the following month the regiment was ordered to the Pacific Coast, via Panama, arriving in the latter part of January, 1856. The headquarters and Companies A, B, C, E, F, G, I and K, took station at Fort Vancouver, W. T., Lieutenant-Colonel Casey with Companies D and H going to Fort Steilacoom, W. T., and thence in a few days into the field in active operations against the Indians of that locality.

In March, 1856, Colonel Wright with Companies A, E, F and I left Fort Vancouver on an expedition to Fort Walla Walla, W. T., then an abandoned Hudson Bay Company's post. After leaving Fort Dalles, Oregon, on the 26th, information was received of an attack by Indians on the settlers at the Cascades, and the command returned to that point by forced march and dispersed the Indians, the ringleaders being made prisoners. The command remained at the Cascades until the latter part of the following month, when the colonel with companies A and C left on an expedition to the Yakima River, being joined in May by Companies B, F, G, I and K. This expedition remained in the field until August and brought about the surrender of five hundred hostile Indians on the Weuache River in the latter part of July. Companies D and H remained in the field nearly all of the year and had several engagements with Indians.

From the close of field operations in 1856 until the spring of 1858, the regiment was principally engaged in building posts and making roads. In August, 1857, Company F was detailed as escort to the Northern Boundary

Commission and remained in the field on that duty nearly three years. In May, 1858, Company E formed part of a force of one hundred and fifty-nine men sent to make a reconnaissance of the country to the north of Fort Walla Walla. On May 17th the command was attacked by over one thousand Indians and after fighting till dark and nearly exhausting their ammunition was compelled to retire. A forced march was begun that night and a distance of seventy-five miles covered by ten o'clock the following morning without the loss of a man or horse.

In August, 1858, an expedition was organized under command of Colonel Wright to proceed against the Spokane Indians and their allies. Companies B and C formed part of this expedition, and after two engagements at Four Lakes and on Spokane Plains, W. T., it was successful in bringing about a lasting peace with the Indians of that section.

Companies C, G and I were in the field in August and September of this year with an expedition under Major Garnett, against Indians to the north of Fort Lincoln, Oregon.

In October, 1860, Company B, with a detachment of Company E, under command of Captain T. F. Dent, left Fort Walla Walla, W. T., to the rescue of emigrants who had escaped from the massacre of September 9th and 10th, 1860, on Snake River.

In May, 1861, two officers and one hundred men of the regiment were detailed as escort to the Fort Benton wagon road expedition, and remained absent on this duty nearly fifteen months.

In the autumn of 1861, after nearly six years of arduous service in Oregon and Washington Territories, the regiment, with the exception of Companies A and C, was ordered to San Francisco, Cal., preliminary to its transfer to the East. The latter order was, however, revoked, and but one company, E, left the Pacific Coast. In January, 1862, the enlisted men of this company, with the exception of the non-commissioned officers, were transferred to the 4th Infantry. The regiment remained on duty at the posts near San Francisco, and performed provost guard duty in that city until late in 1865, when it was distributed to posts in California and Nevada. On the 30th of July, 1865, the regiment lost its colonel, George Wright,—Brigadier-General, U. S. V., and Brevet Brigadier-General, U. S. A.,—who was drowned at sea by the wreck of the steamer *Brother Jonathan*, while en route to assume command of the Department of the Columbia. General Wright's service had been long and varied. He graduated at the Military Academy in 1822, and had served with distinction in many parts of the country. He had received the brevet of major for meritorious conduct in the Florida War and the brevets of lieutenant colonel and colonel for gallant conduct in battle in the Mexican War. In 1858, in Washington Territory, he subdued the Indians and brought about a peace that it is believed has never been broken. Not the least valuable of his services was rendered on the Pacific Coast during the War of the Rebellion, where by his conduct of affairs he was largely instrumental in preserving California to the Union. The regimental orders, announcing his death, after reciting his military record, continue as follows: "Placed in command of the immense Department of the Pacific shortly after the outbreak of the recent rebellion,

he, by his wisdom, so managed the great interests under his control that the burden of the war was scarcely felt within its borders. Deaf alike to the goadings of rebellious spirits and the frenzied appeals of timid loyalists he pursued his course with firmness and moderation to the glorious result. Without bloodshed he accomplished the work of the statesman and soldier, protected the honor of his country's flag and preserved the peace.

General Wright was succeeded by Colonel John H. King, Bvt. Major-General, U. S. A., who assumed command of the regiment in December, 1866. During the period from 1866 to 1869, portions of the regiment were at different times in conflict with Indians in Northern California and Oregon and in Southern California. In June, 1869, after more than thirteen years of service on the Pacific Coast, during which time it had taken an active part in all the Indian troubles and had garrisoned nearly every post in that territory, from Sitka, Alaska, to Fort Mohave, Arizona, the regiment was ordered to the Department of the Platte, where upon arrival in July, the 27th Infantry was consolidated with it. The regiment performed garrison duty at various posts and guard duty on the line of the Union Pacific Railroad until May, 1873, when six companies, A, D, E, F, H and I, were sent to the Department of Dakota for duty with the Yellowstone Expedition, which formed the escort to the engineers locating the Northern Pacific R. R. in that year, returning to the Department of the Platte after an absence of over four months. From the summer of 1874 to May, 1876, the regiment was stationed at posts on or near the Sioux reservation in Nebraska and Wyoming and was almost constantly employed in escort duty to wagon trains. In the summer of 1875 Companies C, E and H, were in the Black Hills, Dakota, as part of the escort to the Jenney exploring party, Company E remaining in the field until November assisting in the ejection of intruders who had entered this territory prior to the extinguishment of the Indian title.

In May, 1876, Companies C, G and H became a part of the Big Horn and Yellowstone Expedition under command of Brig.-General Crook and were in the field until late in October taking part in the engagement with the Indians at Tongue River, Montana, June 9th, Rosebud River, Montana, June 17th, and Slim Buttes, Dakota, September 9th. Companies G and H also assisted in repelling a night attack by Indians on the infantry camp on Goose Creek, Wyoming, July 9, 1876. In the early part of September the entire command was without rations for a number of days, and subsisted on horse flesh and a small quantity of dried meat and fruit captured at Slim Buttes. In October, 1876, the Powder River Expedition was organized and Companies A, B, D, F, I and K formed a part of it. This command remained in the field until January, 1877, during the most severe part of the winter, and practically brought to a termination the warfare against the whites, that had been carried on for many years by the Sioux Indians and their allies. In July 1877, Companies B, D, F, H, I and K were a part of the force sent to Chicago, Illinois, at the time of the railroad riots. They remained a month performing guard duty over various public and private institutions.

During the summer and fall of 1878 Companies B, C, H and I were in the

field for nearly six months as a part of a force of observation under command of Lieut.-Col. L. P. Bradley, 9th Infantry, on the Little Missouri River, and in the northwestern part of the Black Hills. In October of this year Companies G and K were part of the force in the field in connection with the pursuit of the Cheyenne Indians, who raided across the country from Indian Territory to Red Cloud Agency, Dak. Company G remained in camp at Sidney, Neb., and Company K was mounted and took active part in the pursuit, being at one time over thirty-six hours without water. In October, 1879, Companies E and K went into the field in the Ute country in northwestern Colorado shortly after the massacre at White River Agency, remaining until July, 1880. In February, 1882, the colonel of the regiment, Brevet Maj.-Gen. John H. King, U. S. A., was retired and succeeded by Col. James Van Voast, formerly a first lieutenant in the regiment. Col. Van Voast never joined, he being retired in April, 1883. He was succeeded by Col. John S. Mason, Brevet Brigadier General U. S. A. In July, 1885, Companies A, D, E, F and I were part of the force sent to Crisfield, Kas., at the time of the threatened uprising of the Cheyennes and Arapahoes in Indian Territory. After remaining in camp at that point about three weeks they returned to their station in Wyoming. In July, 1886, after serving over seventeen years in the Department of the Platte, the regiment went to the Department of Arizona. Four companies, C, E, H and I, were in the field in New Mexico for about a month during the Apache campaign of that year. During the service of the regiment in this department portions of it were in garrison at every post in Arizona and at some posts in New Mexico. In August, 1888, Col. Mason was retired and was succeeded by Col. Alfred L. Hough, who retained command until April, 1890, when he was retired. He was succeeded by Col. Charles G. Bartlett—who now commands the regiment. In October, 1891, the headquarters and Companies A, D, F and G, were transferred to the Department of the East, Companies B, C, E and H following in May, 1892.



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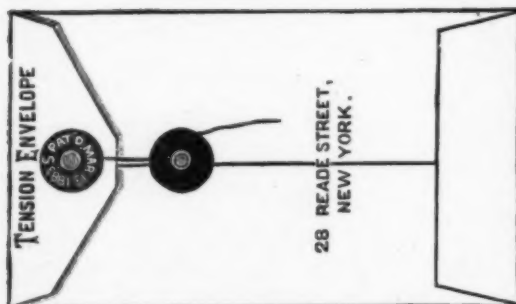
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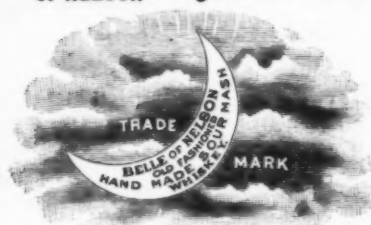
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